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FINAL REPORT

INTERNATIONAL HYDROLOGICAL PROGRAMME

24th IHP Regional Steering Committee meeting for Southeast Asia and the Pacific

Ulaanbaatar, Mongolia

24-26 October 2016

As 7 November 2016



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MINUTES OF THE 24TH MEETING OF THE IHP RSC
(24th-26th October 2016, Ulaanbaatar, Mongolia)

Venue: Kempinski Hotel

- | | | |
|---|--|---|
| 1 | Welcome and opening remarks | <p>Prof Tabios, RSC chairperson, opened the meeting at 9:02 and invited the Ministry of Environment and Tourism of Mongolia and Mongolian national commission for UNESCO to present their welcome and opening remarks.</p> <p>9:03 - 9:08</p> <p>Prof G.Nyamdavaa (Chairperson, Mongolian IHP National Committee) delivered his opening remarks. He emphasised the national sustainable development goals has been approved by the parliament of Mongolia. He mentioned:</p> <ul style="list-style-type: none"> - this event will contribute to develop the National plan for the delivery of SDG6 - Build collaboration and exchanges within peers in the region for sustained cooperation scientifically <p>9:08 - 9:10</p> <p>Secretary General of the Mongolian National Commission for UNESCO MS Uyanga also presented her welcome remarks and her best wishes for a successful meeting.</p> |
| 2 | Opening comments on behalf of RSC and UNESCO | <p>Prof Guillermo Tabios, Chairperson invited all participants to introduce themselves</p> <p>RSC Secretariat represented by Dr Ai Sugiura also welcomed all participants and in particular thanked the participation of Prof Ibrahim Komoo, Vice-chair of UNESCO Global Geopark council, who was invited in an effort to create synergies between Natural Sciences Programmes and to introduce the newly approved International Geoparks and Geosciences Programme to IHP RSC members, and Hans Thulstrup, Programme Specialist for Natural Sciences, UNESCO Office in Beijing .</p> |
| 3 | Adoption of the Agenda (Annex 1) | <p>9:25-9:29 Chairperson presented the agenda of the meeting with the addition in item 14 of two additional points, first a brief presentation from GDRC and second a brief presentation from UNESCO Office Beijing on MAB and IGGP activities in Democratic People's Republic of Korea (DPRK), Japan, Mongolia, the People's Republic of China and the Republic of Korea (ROK).</p> |



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The agenda was adopted by motion from Australia and secondment from Malaysia.

- 4 Secretariat report (Annex 2) 9:30-9:40 RSC Secretariat presented the secretariat report. In particular the status of the five action points from the 23rd RSC meeting.
- Secretary asked what is behind the new synergy effort from Jakarta office. The Secretariat replied it was following the new direction from ADG/SC who would like to see synergetic collaboration between the Science programmes as Biosphere reserves from MAB programme or geoparks are socio-environmental models for sustainable development and those systems are included into river basins or water related ecosystems. Moreover IWRM or HELP river basin management is completely in line with the BR and geoparks integrated management of a territory.
- 5 Report of IGC Bureau (Annex 3) 9:44-10:11 Prof Ian White, former IGC Vice-Chair and Prof Yasuto Tachikawa, IGC Vice-Chair
- Prof White reported six major points from the 53rd session of UNESCO IHP Bureau:
- The high level panel on water (HLPW) proposed by Mexico was formed independently of IHP with the UN-World Bank and IHP will join as friend as WMO is involved as part of the Secretariat.
 - Region I had proposed the term of Bureau be increased from 2 to 4 years and also a problem for appointing alternate members of the Bureau when resignations occur was raised. A consultation with IHP National Committees was made. Council members further requested that such process has to be made in consultation with all IHP National Committees and focal points, involving also all delegations to UNESCO.
 - Category 2 Water Centre : CIRAT (International Centre on Water and Transdisciplinary) in Brazil was approved but it appeared the proposal was not ready and not even supported by IHP Brazil NatCom.
 - The draft Resolution on category 2 centres reporting was presented for further details in item agenda 15.



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- The Communication and outreach strategy from Madam Yan Huang was presented: a) preparation of the communication and outreach strategy for IHP VII, b) identification of key enablers for the fulfilment of IHP's mandate with 5 elements, c) Responsibilities IHP Secretariat which does not have the resources, no dedicated person, d) Responsibilities of IHP Network : the lack of resources when doing this exercise; e) 5 points action plan for communication: action 1: website is not very friendly, no official FB and Twitter accounts but IHP Secretariat is doing it informally, action 2: communication plan , f) challenges & lessons learnt , g) recommendations: use of temporary staff, h) expectations from the council on Draft Resolution, especially on the WEBSITE. This RSC is also important part this communication process.
- Prof White extended his congratulations and thanks to Ms Yan as she was doing amazing work considering the lack of resources at her disposal.

The Secretary who is also Vice-Chair reported the following points:

- Mr András Szöllösi - Nagy was elected as chairperson of IGC
- Prof Tachikawa was appointed as Vice-chairpersons for Group IV
- Institutional developments at UNESCO
 - o The Council elected to the IHP Resolutions Drafting Committee: Mr Ignasius Dwi Atmana Sutapa (Indonesia, Group IV).
 - o The Council elected the members to the IHP Finance Committee: Mr Hanwoo Kang (Republic of Korea, Group IV) .
 - o Ms Yan Huang was elected as Chairperson (China, Group IV) of the IHP Communication and Outreach Committee until the end of the 23rd session of the IHP Council.
- A report on celebrating the 50th anniversary of UNESCO water programmes emphasising in particular for the activities of Group IV during the 22nd IHP-RSC, the book on regional activities and the elections of distinguished hydrologists of the region.



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- Representatives from the UNESCO Secretariat presented examples of cooperation between the IHP and MAB, Man and the Biosphere Programme, and International Geoscience and Geoparks Programme (IGGP), the Management of Social Transformation (MOST) and Bioethics Programmes of the Social and Human Sciences Sector (SHS), and the Intergovernmental Oceanographic Commission (IOC).
- Centres under the auspices of UNESCO:
 - o UNESCO - IHE Institute for Water Education (category 1) : The Chairperson of the Council indicated that the question was whether or not UNESCO - IHE would remain a category 1 institute. On one hand, he noted that if UNESCO - IHE becomes a category 2 centre, this would certainly reduce the impact of the Institute’s activities. The Chairperson concluded that he believes that the two positions could be reconciled with some flexibility, and he summarised the situation by stating that the Council is for UNESCO - IHE to continue as a category I centre. Prof White commented on the importance of IHE-Delft in supporting Water education globally. Prof White reported very intense discussions are taking place between UNESCO and the Dutch government but they do not include IHP but a higher level in UNESCO.
 - o A sunset clause is required so that the UNESCO logo can be removed from Centres that are no longer reporting on activities to the IHP Intergovernmental Council or contributing to IHP’s work program. This has to be done at the UNESCO General Council Level. Requesting Permanent Delegations to consider introducing sunset clauses to Category II centres would promote efficiency and focus on core goals.

6 Country Reports 10:12

(4 min max) part 1
(Annex 4)

The 13 IHP delegates presented their country report for the period November 2015-October 2016. (only major points are reported below and country reports and ppt are available under Annex 4

- 1) Australia highlighted the following points



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- a. : Australia was Vice-Chair of the IGC of IHP from June 2014-2016.
 - b. IHP Australia work is done mostly on voluntary basis even though it is very important network for Australia.
 - c. There are several programmes in Australia to tackle water challenges in Australia: WIRADA (Water Information Research and Development Alliance) and programmes on groundwater management, Pacific Island water scarcity issues, Climate change impact, study on El Nino differential impacts over the Pacific, water security.
- 2) China presented their past year IHP activities as in Annex 4.
 - 3) Indonesia presented their past year IHP activities as in Annex 4.
 - 4) Japan presented Japan IHP major activities during the past year especially the MEXT SOSEI project on climate change, the 3rd Global Summit of Research Institutes for Disaster Risk Reduction GADRI in March 2017 in DPRI, Kyoto University, the International Summer School by Tokyo University and ICHARM 2weeks programme as well as activities funded by JFIT.
 - 5) Malaysia reported on activities undertaken during the report period at national and regional level mainly through projects supported by MFIT. Details are provided in Annex 4.
 - 6) Mongolia presented their activities undertaken during the reporting period and by expressing Mongolia IHP to strengthen collaboration between UNESCO and Mongolia through a joint statement on future cooperation in three points:
 - The meeting is a great opportunity to strengthen the cooperation between UNESCO and the RSC members
 - Intensification of the cooperation between all of us to solve the water related problems and to contribute to the SDG 6 (clean water and sanitation)
 - Close collaboration to develop and carry out joint projects and events
 - 7) Myanmar presented their past year IHP activities as in Annex 4.

6 Country Reports IHP delegates (11:22)
(4 min max) part 2
(Annex 4)



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- 8) New Zealand: IHP links to government priorities which is link with infrastructure: a) importance of access to data (APFRIEND), b) Flood estimation (APFRIEND), c) IHP VIII
- 9) Papua New Guinea reported on their activities undertaken during the reporting period as follows: 1) 2. Activities Organized by the National Committee, 2) Other Hydrological & Water Related Activities Conducted by Individual Water Agencies, 3) Participation in Regional Programs, 4) Future Tasks. (details in Annex 4)
- 10) Philippines reported on their activities undertaken during the reporting period and in particular on “Highlights of Activities of Most Active of Philippine National Committee Members”. It was underlined that in the Philippines there was a water governance crisis rather than a water crisis and institutional reforms were needed. (details in Annex 4)
- 11) Republic of Korea reported on their activities during the reporting period focusing on :
 - a) The Korean National Committee for the IHP has been preparing for the establishment of a UNESCO Category II Water Centre, the International Centre for Water Security and Sustainable Management (i-WSSM) at the K-water Institute, Republic of Korea which was unanimously endorsed by all member states in the 20th Session of the Intergovernmental Council of the IHP and approved by the General Conference in 2013.
 - b) The International implementation roadmap and monitoring of implementation (19 champions were invited during the second week of October Oct) developed during the 7th World Water Forum (WWF) will be included in the 8th WWF in Brazilia. (details in Annex 4)
- 12) Thailand presented the report on Thai activities during the reporting period: 1) Activities at national level in the framework of the IHP, 2) Research/applied projects supported, 3) Future activities. (details in Annex 4)
- 13) Vietnam reported on their activities during the reporting period: 1) Activities undertaken in the period October 2015 - October 2016 with a focus on the installation of FFGS (Flood Forecasting Guidance System) from HRC (Hydrological



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Research Centre) (USACE), 2) Future activities. (details in Annex 4)

- 7 Updates from the centres under the auspices of UNESCO in the Asia Pacific Region (Annex 5)
- Category 2 centres reported on their activities during the reporting period.
- 1) APCE presented the activities of APCE during the reporting period. (details in Annex 5)
 - 2) HTC-KL reported about their activities during the reporting period. In particular it was reported there is still no nominated director and Dr Norlinda is still the acting director. It was also reported that in Malaysia the “IWRM” is now replaced by “Water Security” as it is more widely understood. For South-South cooperation, HTC-KL started a special programme on training on Urban Stormwater Management with Ethiopia. (details in Annex 5)
 - 3) ICHARM presentation core message was the gratitude of ICHARM to all its partners who have made possible its 10th anniversary including the support of IHP-RSC. The long term targets adapted under the new governing board were presented: 1) Data & Statistics, 2) Risk Assessment (not only hazard but including vulnerability), 3) risk change identification, 4) support in sound policy making (new strategy of IFI), 5) support in community of practices. (details in Annex 5)

- 8 Report of the 7th International Conference on Water Resources and Environment Research (ICWRER2016), 5-
- Yasuto Tachikawa reported on the achievements of the 7th ICWRER 2016 and especially the UNESCO IHP-RSC, IDI and IFI for the delivery of SDGs in the region with the presentations of the recommendations from the session “Actions for strengthening regional water cooperation for a water secure region”.



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9 June 2016 in
Kyoto, Japan
(Annex 6)

9 26th IHP Nagoya
Training Course
(Annex 7)

Yasuto Tachikawa introduced the 26th IHP-TC on “Coastal Vulnerability and Freshwater Discharge” from 27 November -10 December 2016 covering theme 3, 4 and 5 of IHP-phase VIII.

A message from Prof Ishizaka, leader for Nagoya University for the IHP-Training Course was delivered on the need to mobilise sponsorship for international students to attend the IHP-TC as the financial support from Japanese government has become very limited.

10 Post- Catalogue of
Rivers Initiative:
Updates on
Catalogue of
Hydrologic
Analysis modules
(Annex 8)

(13:47)

Kenichiro Kobayashi introduced the background of the Catalogue of Hydrological Analysis (CHA) which was proposed at the 22nd RSC meeting in Yogyakarta. Since then the following activities were undertaken:

- In December 2013, the first regional call for contributions was made.
- At ICWRER2016, the first technical coordination meeting took place during the session with IDI and IFI and UNESCO Jakarta (June 2016)
- A Japanese coordination meeting took place in August 2016
- The latest regional call for contributions was made at the region at the Bali meeting (July 2016)
- The website prototype was presented to the RSC. It comprised : 1) module from Prof Tachikawa and 2) module on RRI from Prof Sayama, 3) evapotranspiration module from Prof Kobayashi and 4) a page on “how to contribute to CHA?” with a word document with the format on how to send contribution to CHA.
- The RSC members discussed on 1) if the name “Catalogue of Hydrological Analysis” was appropriate, 2) what CHA was trying to achieve. The CHA Japanese team underlined CHA is not intended to be a Japanese initiatives but all RSC members were encouraged to participate and contribute what they can or want. It was concluded:



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- a “task force team” has to be formed and the current technical sub-committee can be the initial task force team
- There is a need for the task force team to conduct some kind of literature review in order to assess if there is any other existing initiative with the same purpose
- a regional call for contributions will be resent to all RSC members by a task force and all RSC members are highly encouraged to consider what they can contribute and commit.
- In the light of the received commitments, the name as well as the purpose of the current CHA will be redefined.

- | | | |
|----|--|--|
| 11 | Organization of the 25 th RSC meeting in 2017 and associated conference | <p>The Chair reminded Manila has been proposed and agreed during the 23rd IHP-RSC meeting.</p> <p>The precise dates need to be confirmed but the 25th IHP-RSC will take place during the week of 13 November 2017. The two options are:</p> <ol style="list-style-type: none"> 1) Metro Manila 2) Tagaytay Taal volcano |
| 12 | Organization of the 26 th RSC meeting in 2018 and associated conference | <p>China expressed its willingness to host the 26th RSC meeting for 2018 and a proposal will be submitted during the 25th RSC-IHP.</p> <p>For the 27th IHP-RSC for 2019, Myanmar was requested to consider the possibility of hosting the meeting as they could not host the 23rd IHP-RSC.</p> <p>For the 28th IHP-RSC for 2020, Malaysia and Vietnam expressed their willingness to host the meeting.</p> |
| 13 | Election of RSC Secretary | <p>The Chairperson proposed Prof Tachikawa to remain the Secretary and RSC members re-elected Prof Tachikawa as Secretary.</p> |
| 14 | Any other issues (Annex 9, 10, 11) | <ol style="list-style-type: none"> 1) Hans Thulstrup, Science Programme Specialist from UNESCO Office Beijing reported on Man and Biosphere (MAB) and International Geoparks and Geosciences Programme (IGGP) activities in East Asia and Beijing cluster countries. (Annex 9) 2) Ulrich Looser from GRDC presented the activities and the mission of GRDC as well as ICWRGC UNESCO Category 2 Centre by highlighting GEMstat water quality data base. Water quality data are gathered from national authorities in order to perform |



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an assessment and reporting on global state of water quality. Mr Ulrich requested the participants to encourage their link to governmental offices to share data on water quality. He also presented the 15th meeting of the Commission of Hydrology (CHy) in Rome, Italy in December 2016 and requested IHP-RSC members to encourage national WMO representatives (hydrological advisor) to participate at CHy-15 and support GRDC and GEMStat.

- 3) Prof Takara announced the 3rd Global Summit of Research Institutes for Disaster Risk Reduction under the Global Alliance of Disaster Research Institutes Disaster Risk (GADRI) to take place in Kyoto from 19-21 March 2017. The participation of around 300 participants, 103 organisations from 27 countries are expected. It was also noted that the membership of GADRI is free and Prof Takara encouraged RSC members to participate to the gathering.

15 Adoption of Resolutions (Annex 12)

Three draft resolution presented during the 23rd RSC and agreed to need their formulation changed were presented for approval :

- 1) DRAFT 7th WWF: approved (motion by Prof White and seconded by Mr Dennis)
- 2) DRAFT Runoff data archives: approved (motion by Prof White and seconded by Prof Lee)
- 3) DRAFT qualifications for filling vacant core staff positions in the secretariat of UNESCO's IHP: was adopted with the change (remove NOTING WITH ALARM) (motion by Prof White and secondment by Mr Ulrich)

The draft resolution submitted this year by Australia on Category 2 Centre2C entre and Chairs reporting was presented. The following points were noted during the discussion by RSC members:

- Category 2 Water Centres are important members of the UNESCO Water Family
- The award of the UNESCO brand-name to Category 2 Water Centres is prestigious
- Currently there is no mandatory requirement for Category 2 Centres to report to IHP's Intergovernmental Council and some Centres fail to report to IGC.



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- This means IHP has no complete assessment of progress on IHP's work program and makes the organisation appear inefficient
- Only the UNESCO General Conference has the power to impose conditions for Category 2 Centres.
- The bottom line of this resolution is encouraging regular reporting of Category 2 Water Centres and for permanent delegations to the GC to raise the issue of mandatory reporting to IHP IGC as a condition for continuing a Category 2 Centre, as a more regular process than the evaluation every 5 years.
- UNESCO explained the UNESCO Category 2 centre and chairs have different mechanisms and it might be just that the processes are different as all UNESCO Chairs, including Water chairs, report to the Education sector and not to the respective sector like Natural Sciences for instance.
- Australia put the motion and it was seconded by Korea. The resolution was adopted without any objection.

16 Closing of the Meeting

Prof Komoo was invited to give his impressions of his first IHP-RSC meeting. He expressed he learnt a lot about the process of the decision making of this group and for this region and he appreciated the good balance between more developed countries with a lot of activities and some less developed countries with more challenges in tackling their water issues.

RSC Chairperson closed the meeting at 16:07

Action points:

	Action	Person	Deadline
Action 1	Follow-up on Action 1 and 2 from 23rd IHP-RSC	Chairperson	ASAP
Action 2	<p>Related to CHA</p> <ul style="list-style-type: none"> ○ a “task force team” has to be formed and the current technical sub-committee can be the initial task force team ○ There is a need for the task force team to conduct some kind of literature review in order to assess if there is any other existing initiative with the same purpose 	<p>Prof Chikamori, Prof Kobayashi, Prof Tachikawa</p>	Not defined



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	<ul style="list-style-type: none"> ○ a regional call for contributions will be resent to all RSC members by a task force and all RSC members are highly encouraged to consider what they can contribute and commit. ○ In the light of the received commitments, the name as well as the purpose of the current CHA will be redefined. 		
Action 3:	All adopted resolutions to be sent by Secretariat to IHP-Secretariat	Secretariat	ASAP

Annex 1 - agenda of the 24th meeting of the IHP RSC

(24th-26th October 2016, Ulaanbaatar, Mongolia)

Venue: Kempinski hotel

Time	Nr.	Agenda item	Responsible person
23 October 2016		Arrival of international participants	Pick up service will be arranged by the organizers
Day 1 -24 October 2016			
24th IHP-Regional Steering Committee South East Asia Pacific meeting			
8:30-9:00	0	Registration	
9:00-9:10	1	Welcome and opening remarks	Dr G.Nyamdavaa, Chairperson, Mongolian IHP National Committee and Director-General of the Department of Land Management and Integrated Water Resources Policy and Regulation, the Ministry of Environment and Tourism, Mongolia
9:10-9:25	2	Opening comments on behalf of RSC and UNESCO	Prof Guillermo Tabios, Chairperson Prof Yasuto Tachikawa, Secretary Prof Shahbaz Khan, RSC Secretariat
9:25-9:40	3	Adoption of the Agenda	Prof Guillermo Tabios, Chairperson
9:40-9:55	4	Secretariat report	RSC Secretariat
9:55-10:10	5	Report of IGC Bureau	Prof Ian White, former IGC Vice-Chair and Prof Yasuto Tachikawa, IGC Vice-Chair
10:10-10:40	6	Country Reports (4min max) part 1	IHP delegates
10:40-10:55		Coffee break	
10:55-11:25	7	Country Reports (4min max) part 2	IHP delegates
11:25-11:55	8	Updates from the centres under the auspices of UNESCO in the Asia Pacific Region	Category 2 centres
11:55-12:10	9	Report of the 7 th International	Prof Guillermo Tabios, Prof Yasuto

		Conference on Water Resources and Environment Research (ICWRER2016), 5-9 June 2016 in Kyoto, Japan	Tachikawa
12:10-12:15	10	26 th IHP Nagoya Training Course	Prof Yasuto Tachikawa
12:15-13:45		Lunch break	
13:45-14:15	11	Post-Catalogue of Rivers Initiative: Updates on Catalogue of Hydrologic Analysis modules	Prof Hidetaka Chikamori and Prof Kenichiro Kobayashi
14:15-14:30	12	Organization of the 25 th RSC meeting in xxxx and associated conference	RSC Secretariat
14:30-14:45	13	Organization of the 26 th RSC meeting in xxxx and associated conference	IHP delegates, RSC Secretariat
14:45-15:00	14	Election of RSC Secretary	IHP delegates
15:00-15:15	15	Any other issues	IHP delegates
15:15-15:30	16	Adoption of Resolutions	IHP delegates
15:30-15:40	17	Closing of the Meeting	Prof Guillermo Tabios, RSC Chairperson
15:40-16:00		Coffee break	
19:00		Dinner	

<p style="text-align: center;">Day 2: 25 October 2016</p> <p style="text-align: center;">Theme: International and national water dialogue on the delivery of SDG 6 in Mongolia and wider Asia and the Pacific region</p>			
8:00-8:30	0	Registration	
	1	OPENING SESSION	
8:30-8:40	1.1	Opening remarks	UNESCO Regional Science Bureau for Asia and the Pacific, Prof Shahbaz Khan
	2.2	Opening speech	H.E. Mr Ts.Tsengel, State Secretary of the Ministry Of Environment and Tourism of Mongolia
	2	TECHNICAL SESSIONS: DELIVERY OF SGD 6 IN MONGOLIA AND WIDER ASIA AND THE PACIFIC REGION	
	<u>2.1</u>	<u>International session 1: Water Security in Arid Environment</u>	
8:40-9:00		Keynote address on UNESCO's key water issues	UNESCO Regional Science Bureau for Asia and the Pacific, Prof Shahbaz Khan
9:00-9:20		Keynote address on water problems in Mongolia	Mr Sh.Myagmar, Director of the Division of Water resource, the Ministry of Environment and Tourism, Mongolia
9:20-9:40		Keynote 2: "Summary of UNESCO-Chair Program on Sustainable Groundwater Management in Mongolia: Toward a Standard of Water Governance Considering Groundwater / Surface Water Interaction in Semi-arid Regions"	Prof Maki Tsujimura - UNESCO Chair on Sustainable Groundwater Management and University of Tsukuba, Japan
9:40-10:00		Keynote 3: Using IWRM for better infrastructure: case study from Canterbury	Dr Dennis Jamieson -Project Leader - Water Infrastructure Environment Canterbury
10:00-10:15		Coffee break	
10:15-10:45		Panellists' presentation (5 panellists, 5 min each) <ul style="list-style-type: none"> - Prof Yasuto Tachikawa Kyoto University - Mr Ulrich Looser, GRDC - Dr Z.Batjargal, Special envoy of Climate change, and a former Minister of Environment - Dr P.Batima, Coordinator of Mongolian water forum - Dr D.Basandorj, CWP Mongolia/GWP 	

10:45-11:00		Panel Discussion on “Water Security in arid environment” moderated by Prof Ian White, USP (5 panellists)	
	<u>2.2</u>	<u>International session 2: Integrated UNESCO initiatives in Water and Environment</u>	
11:00-11:15		Keynote 1: Geopark as a model for environmental sustainability	Prof Ibrahim Komoo, UKM, Malaysia, Chair Asia Pacific Geoparks Network
11:15-11:35		Keynote 2: Biosphere reserve, a model for sustainable environmental management	
11:15-11:25		2.1) MAB Activities in Japan and collaboration between MAB and IHP	Prof Yasuto Tachikawa (representing MAB Japan)
11:25-11:35		2.2) The Management and challenges of the Biosphere reserves of Mongolia	Mr Ch.Batsansar, Head of the Mongolian National MAB Committee and Director-General of the Protected Areas Administration Department
11:35-11:50		Keynote 3: IWRM Implementation for Water Security under SDG6	Prof Soontak Lee - Distinguished Professor, Yeungnam University President, International Hydrologic Environmental Society (IHES) Governor, World Water Council (WWC)
11:50-12:30		<p>Panel Discussion on "Water security for a better life: water in a healthy, productive environment and ecosystems"(synergy of IHP with other UNESCO Natural Science Programme MA Band IGGP in AP region) moderated by Prof Kaoru Takara, Kyoto University</p> <ul style="list-style-type: none"> - Prof Ibrahim Komoo, UKM - Prof Yasuto Tachikawa, Kyoto University - Mr Ch.Batsansar, Head of the Mongolian National MAB Committee and Director-General of the Protected Areas Administration Department - Prof Soontak Lee, Yeungnam University - Dr Md Nasir bin Md Noh, Malaysia IHP - Prof Ts.Adiyasuren, Advisor of the Minister of Environment and Tourism, and a former Minister of Environment (Mongolia) - Prof Kuniyoshi Takeuchi, ICHARM 	
12:30-13:30		Lunch break	
	<u>2.3</u>	<u>Mongolian perspectives on water security</u>	
13:30-13:50		Climate change impacts on water resources and adaption measures in Mongolia	Dr G.Davaa, Head of Hydrological Sector, Institute of Hydrology and Meteorology
13:50-14:10		Hydrogeological mapping and ground water resources development and arid environment of Mongolia	Dr N.Jadambaa, Geological Survey Center

14:10-14:30		Water supply management, challenges and priorities	Dr L.Janchivdorj, Head of Sector for Water Resources and Water Resources Utilization, Institute of Geography and Geocology, Mongolia
14:30-14:50		Q&A All participants	
14:50-15:05		Coffee break	
	<u>3</u>	<u>DIALOGUE</u>	
15:05-16:05	3.1	Dialogue/group discussions (2-3 groups) on scoping Mongolian and UNESCO joint programme on delivering SDG 6 in Mongolia and wider Asia and the Pacific region. All participants	
16:05-16:20	3.2	Presentation from each group (5min per group) All participants	
	<u>4</u>	<u>CLOSING SESSION</u>	
16:20-16:40		Presentation of the Mongolia/UNESCO joint statement on delivering SDG 6 in Mongolia and wider Asia and the Pacific region	UNESCO Regional Science Bureau for Asia and the Pacific, Prof Shahbaz Khan
16:40-17:20		Closing remarks	H.E. Mr Ts.Tsengel., State secretary of the MET
			IHP RSC
			Prof Shahbaz Khan, Director of UNESCO Regional Science Bureau for Asia and the Pacific
19:00	5	Dinner	Dinner hosted by H.E. Mr Ts.Tsengel, State secretary of the MET

programme of the field trip 26th October

2016, Ulaanbaatar, Mongolia

	Time	ARRANGEMENT
26th OCTOBER (WEDNESDAY)	10:00- 10:50	Depart from hotel and travel to upper drinking water sources of Ulaanbaatar city /20km/
	10:50- 11:40	Visit in upper drinking water sources of Ulaanbaatar city
	11:40- 12:30	Travel to the Tsonjin boldog complex /35km/ (The statue of Genghis Khan is 40m high (131 feet), made of stainless steel and was erected in 2008).
	12:30- 13:30	Visit in museum at the Tsonjin boldog complex
	13:35- 14:40	Lunch
	14:40- 15:00	Travel to the crossing point of the Arctic basin, the Pacific basin and the Central Asian basin without external flow. Khundlun uul is located in Erdene sub province of Tuv province. /25km/
	15:00- 16:30	Hike up to the Khundlun mountain /about 2-3km/
	16:30- 18:00	Travel back to the Ulaanbaatar city
	19:00	Dinner
27th OCTOBER (THURSDAY)	Departure (Drop off service will be arranged by the organizers)	

Annex 2 -

SECRETARIAT REPORT UNESCO Science Bureau for Asia and the Pacific (November 2015-October 2016)

24th RSC meeting
23rd October 2016
Ulaanbaatar, Mongolia



5 action points from 23rd IHP- RSC 1/2

Action	Responsible person	Deadline	Status
ACTION POINT 1: send letter of appreciation on behalf of RSC committee to 7th WWF organizing committee for their success and importance for IHP and the region.	Chairperson	asap	On progress
ACTION POINT 2: send a congratulation letter should be addressed from this committee by the chairperson to Prof Takahashi for being awarded the Japan price.	Chairperson	asap	On progress
ACTION POINT 3: in order to develop the catalogue of hydrological analysis, form a technical sub-committee for which chair and members of the sub-committee should be selected.	Mr Chikamori and all members	Not set	- Discussion at ICWRER2016 - to be reported at agenda item 10

5 action points from 23rd IHP- RSC 2/2

Action	Responsible person	Deadline	Status
ACTION POINT 4: 24th IHP-RSC meeting dates and places will be discussed between Mongolia and the secretariat.	secretariat	By end of 2015	Done
ACTION POINT 5: Three resolutions were submitted and agreed by all members however wording for each of them will be reviewed and circulated among members.	Vice-Chair region AP and GDRC/Mr Takara	Not set	<ul style="list-style-type: none"> - Was circulated by secretariat for comments and editing - To be submitted for final adoption at 24th IHP-RSC

- **[DRAFT] APPRECIATION OF THE EFFORT INVOLVED IN THE 7th WORLD WATER FORUM**
- **[DRAFT] Resolution for RUNOFF DATA ARCHIVES**
- **[DRAFT]-QUALIFICATIONS FOR FILLING VACANT CORE STAFF POSITIONS IN THE SECRETARIAT OF UNESCO'S INTERNATIONAL HYDROLOGICAL PROGRAMME**

Main Progress/Achievements on the Implementation of IHP in Asia and the Pacific

Selected Studies implemented and ongoing on water resources in Asia and the Pacific region by IHP VIII theme

Theme I : Water-related Disasters and Hydrological Changes

1. IFI, IDI activities

- IFI launching its new strategy with study river basins in seven countries in Asia
- Side-event (31 October) to HELP Water and Disaster meeting (1 Nov 2016), Jakarta, Indonesia

2. JICA supported project: “Strategic strengthening of flood Warning & Management Capacity of Pakistan-phase 2”

- Now entering the last year of implementation
- 2 international workshops, hands-on model training in Pakistan including officers from Afghan Ministry of Environment and Afghanistan National Disaster Management Authority.



Main Progress/Achievements on the Implementation of IHP in Asia and the Pacific

Selected Studies implemented and ongoing on water resources in Asia and the Pacific region by IHP VIII theme

Theme III : Addressing Water Scarcity And Quality

1. Comparative Studies of Applying Ecohydrology and IWRM for Upscaling Water Security in Asia & Africa through UNESCO Category II Water Centres (7-9March 2016, Malaysia) (MFIT).
2. "Strategic Water Management: International Experiences and Practices" (Singapore water week, 14 July 2016)
 - co-published through a collaboration between ADB, GIWP, UNESCO, and WWF-UK
3. Sustainability Framework for IWRM, Water Governance, water tariffs and pricing policies in urban areas (10-12August 2016, Cebu City, Philippines) (MFIT)
 - Principles of sustainable water tariffs and pricing (full-cost recovery, economic efficiency, equity and administrative feasibility)



Main Progress/Achievements on the Implementation of IHP in Asia and the Pacific

Selected Studies implemented and ongoing on water resources in Asia and the Pacific region by IHP VIII theme

Theme IV : Water and Human Settlements of the Future

1. **Sustainability Science: Davao City as a UNESCO Pilot Project to deliver SDGs 6 and 11 of UN Development Agenda 2030 and Langat HELP river basin (3-4Feb2016, MFIT, JFIT).**

2. **Megacities water and climate change need for an integrated approach in AP (11July2016)**

- global platform, develop resilience agenda, and build support for a critical future management of Megacities, Water, and Climate Change

3. **Two Urban water projects. water supply for local communities (IFIT)**

- **Medan City** : UNESCO,PDAM Tirtanadi conduct a comprehensive study on improving water services towards water security in Medan City to support the clean water supply expansion to reach larger local community.
- **Jember City** : a study on "The Role of Community Participation in Peri-Urban Water Management towards Sustainability of Water Supply in Jember City". The activities involve the local communities and strengthen the local stakeholders participation in managing water in respective areas.



Main Progress/Achievements on the Implementation of IHP in Asia and the Pacific

Selected Studies implemented and ongoing on water resources in Asia and the Pacific region by IHP VIII theme

Theme V : Ecohydrology, Engineering Harmony for a Sustainable World

1. Three ecohydrology based projects (IFIT)

- Saguling Reservoir, Citarum River Basin and Ex Mega Rice Project ecohydrology demonstration sites:
- "Sustainable Water Management in Yogyakarta City and Borobudur Surrounding Areas" by using Ecohydrology approach to improve water management in Yogyakarta City and Borobudur District
- Ecological and Eco-hydrological Solutions for Sustainable Management in Indonesia and Asia Pacific Region (with APCE)

2. SHARP Langkawi (23-26Nov2016) (MFIT)

- "Water and Environmental Sustainability in Langkawi"



Main Progress/Achievements on the Implementation of IHP in Asia and the Pacific

Selected Studies implemented and ongoing on water resources in Asia and the Pacific region by IHP VIII theme

Theme VI : Water Education Key for Water Security

1. **World Water Day (25 March 2016) Jakarta (IFIT)**
 - With Global Launching of UN-World Water Development Report 2016: Water and Jobs
2. **Special session at ICWRER 2016 (6 June 2016) (JFIT)**
3. **L'Oreal Women in Science Indonesia Students Celebrates the Conservation of the Mangrove Ecosystem (26 July 2016, Jakarta)**
4. **“SDG 4, 6, 17: Inauguration of the Multi-Stakeholders Partnership: Water Education in Pari Island, Kepulauan Seribu” (8 Oct 2016) (IFIT)**



Main Progress/Achievements on the Implementation of IHP in Asia and the Pacific

Selected Studies implemented and ongoing on water resources in Asia and the Pacific region – Regional activities

1. **Mobilizing Experts for the Advancement of Water Education in the Region (24-26 May 2016, Medan Indonesia)**
 - “Medan Statement on Advancing Water Education in Asia and the Pacific”
2. **ICWRER 2016 : UNESCO IHP-RSC, IDI, IFI special session: Regional delivery of SDGs a focus on Hydroinformatics and Education for Hydrohazards (6 June 2016, Kyoto, Japan)**
 - Recommendations: “Actions for strengthening regional water cooperation for a water secure region”
3. **Singapore water week: 19th Governing Council Meeting of the Asia Pacific Water Forum (APWF) and the 2nd Board of Council Meeting and Special Session of the Asia Water Council (AWC), 13 July 2016, Singapore.**
 - Regional Coordination Mechanisms on Water during the Singapore International Water Week 2016



Main Progress/Achievements on the Implementation of IHP in Asia and the Pacific

Selected Studies implemented and ongoing on water resources in Asia and the Pacific region – Regional activities

4. **UNESCO Networks in the Field: Fostering Collaboration for Delivering 2030 Agenda** (21-24 July 2016, Bali, Indonesia)
5. **World Culture Forum: “Water for Life: Reconciling Socio-Economic Growth and Environmental Ethics”** (11-12 October, Bali, Indonesia)
6. **24th IHP-RSC meeting in conjunction with The international and national water dialogue on the delivery of SDG 6 in Mongolia and wider Asia and the Pacific region**, (24-26 October 2016, Ulaanbaatar Mongolia)
7. **International Conference: Asia Pacific Policy Dialogue on Water, Energy and Food Security for Poverty Alleviation in Dryland Regions co-hosted by UNESCO and PMAS-AAUR** (23-25 November 2016, Rawalpindi, Pakistan)



The Secretariat acknowledged the outstanding financial support from Member States through the Funds-in-Trust mechanism; particularly to:

- Indonesian Funds-in-Trust (IFIT)
- Japanese Funds-in-Trust (JFIT)
- Malaysian Funds-in-Trust (MFIT)

THANK YOU



- 23-26 Nov 2015 Inception Workshop on Sustainability Science Demonstration Site: Framework For Action “Water and Environmental Sustainability in Langkawi” under the MFIT project SHARP (Science Harnessed for ASEAN Regional Policy)
 - to mark the start-up of the research for the establishment of the Sustainability Science Demonstration Site in Langkawi, the Institute for Environment and Development (LESTARI) of the Universiti Kebangsaan Malaysia (UKM), organized with the support of UNESCO Jakarta a three days’ workshop on “Sustainability Science Demonstration Site: Framework For Action: Water and Environmental Sustainability in Langkawi” from 23 to 26 November 2015, in Langkawi, Malaysia.
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/inception_workshop_on_sustainability_science_demonstration_site_framework_for_action_water_and_environmental_sustainability_in_langkawi_under_the_mfit_project_sharp_science_harnessed_for_asean_regional_policy/#.WAresPI97IU



- 3-4 February 2016 Sustainability Science getting momentum in Davao City as a UNESCO Pilot Project to deliver SDGs 6 and 11 of UN Development Agenda 2030
 - In collaboration with the Department of Science and Technology (DOST) and HELP (Hydrology for Environment, Life and Policy) Davao Network, UNESCO Office, Jakarta conducted a “Stakeholder Consultation Meeting” in Davao City, from 3 to 4 February 2016.
 - Officiated by the Chairperson of HELP Davao Network, Ms. Marissa Salvador-Abella and the Director of UNESCO Office, Jakarta, Mr. Shahbaz Khan, the consultation aims to gather community leaders to discuss and analyse stakeholders’ perspectives on sustainability issues and solutions for a new Urban Vision and Commitment towards a Resilient City.
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/sustainability_science_getting_momentum_in_davao_city_as_a_unesco_pilot_project_to_deliver_sdgs_6_and_11_of_un_development_agenda_2030/#.WArelPI97IU



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- 7-9 March 2016 UNESCO Water Family in Malaysia and Experts from Asia and Africa Delineate Water Security Options
 - UNESCO Jakarta is contributing to the delivering of SDG 6.5 on Integrated Water Resources Management (IWRM) by supporting a workshop on “Comparative Studies of Applying Ecohydrology and IWRM for Upscaling Water Security in Asia & Africa through UNESCO Category II Water Centres”.
 - The IWRM and Ecohydrology Concepts were introduced by Prof Shahbaz during his opening remarks. The workshop was aimed to disseminate the outcomes of a study conducted by the Humid Tropic Centre Kuala Lumpur (HTCKL), a category 2 centre under the auspices of UNESCO and a consortium of local universities in Malaysia on the need for a better planning and adaptation for responding to water challenges and ensuring water security in the region. This workshop has enabled to showcase comparative studies on applying Ecohydrology and Integrated Water Resources Management (IWRM) approached as well as the development of modular curriculum for the training of water managers to improve water security in the region.
 - Public Outreach Program River of Life (POP RoL), a River Resource Centre (Open Classroom Taman Warisan) which is established to generate evidential improvement in attitudes and behaviours of local population and residents living along the river, towards river care and preservation in order to improve water quality and reduce pollution in the main river of the city of Kuala Lumpur, Malaysia. During the visit, participants got the opportunity to test the quality of the water at the upstream of Klang River.
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/unesco_water_family_in_malaysia_and_experts_from_asia_and_africa_delineate_water_security_options/#.WAreiPI97IU





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- 4- April 2016 World Water Day 2016 Workshop and Global Launching of UN-World Water Development Report 2016: Water and Jobs
 - UNESCO Office, Jakarta in collaboration with Universitas Indonesia, and Indonesia Global Compact Network organized a workshop to celebrate World Water Day 2016. This year WWD celebration was also joining the global launching of the World Water Development Report (WWDR) 2016 with theme of “Water and Jobs”.
 - This year theme is highlighting the vital role of water in generating and sustaining jobs across a wide array of sectors and in unlocking the potential for indirect employment opportunities through its multiplier effects. Water is an essential component of national and local economies, and is needed to create and maintain jobs across all sectors of the economy. By addressing the water-jobs nexus, notably through coordinated policies and investments, therefore the sustainable development in both developed and developing countries will be achieved (WWDR 2016).
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/world_water_day_2016_workshop_and_global_launching_of_un_world_water_development_report_2016_water_and_jobs/#.WAreV_I97IU



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- 13-14 April 2016 National Strategic Meeting on Water Security and SDGs in Indonesia
 - In line with the new Development Agenda 2030 on SDGs, UNESCO Office Jakarta organized National Strategic Meeting on Water Security and SDGs in Indonesia in Grand Kemang Hotel, Jakarta from 13 to 14 April 2016. This meeting was attended by 43 (17 women and 24 men) from different institutions, such as Ministry of Public Works, UN-Indonesia Global Compact Network for Indonesia, Asia-Pacific Centre for Ecohydrology (APCE), PDAM Tirtanadi Medan and several universities from different regions of the country (University of Indonesia, ITB Bandung, IPB, Gadjah Mada University, Brawijaya University, University of North Sumatera, Timor University, Sam Ratulangi University and Atmajaya University).
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/national_strategic_meeting_on_water_security_and_sdgs_in_indonesia/#.WAreVvl97IU





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- 24-26 May 2016 Mobilizing Experts for the Advancement of Water Education in the Region
 - To build water education capacity for water security in Asia and the Pacific region, UNESCO office, Jakarta in collaboration with PDAM Tirtanadi organized a three days “Experts’ Consultation Meeting for Advancing Water Education in Asia and the Pacific” held from 24 to 26 May 2016 in Medan, Indonesia.
 - This strategic event brought together, well-renowned water experts from Australia, India, Indonesia, Korea (Rep. of), Malaysia, Pakistan and Philippines. These experts were selected according to their international and regional experience on designing, implementing and delivering water education, as well as a good knowledge on UNESCO-IHP water mandate and global Agenda 2030.
 - The meeting helped to discuss about the state of the art of water education in the region, the key challenges in delivering water education at national level, the priority sectors for investment in water education (formal or vocational training/education) and also a set of recommendations aiming to guide policy makers and governments in Asia and the Pacific region on the need to strengthen water education was made. On the first day of the meeting a special session on “Role of Hydro-informatics and Integrated Water Resource Management under UN - Agenda 2030” was organized via teleconference with the UNESCO Water Chair at COMSATS Institute of Information Technology (CIIT) Wah, Pakistan.
 - **“Medan Statement on Advancing Water Education in Asia and the Pacific”**
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/mobilizing_experts_for_the_advancement_of_water_education_in_the_region/#.WAreUfl97IU





- 7 June 2016 UNESCO IHP-RSC, IDI, IFI special session: Regional delivery of SDGs a focus on Hydroinformatics and Education for Hydrohazards – ICWRER 2016
 - On 7 June 2016, a UNESCO International Hydrological Programme Regional Steering Committee (IHP-RSC), International Drought Initiative (IDI), International Flood Initiative (IFI) special session took place at ICWRER 2016 in Kyoto, Japan. The theme of the session was “Regional delivery of SDGs a focus on Hydroinformatics and Education for Hydrohazards” in Asia and the Pacific region and four distinguished panellist, Prof Guillermo III Tabios, current chairperson of IHP-RSC and from University of the Philippines, Prof Kenichiro Kobayashi from Kobe University and member of IHP-RSC, Prof Toshio Koike Director of International Centre for Hazard and Risk Management under the auspices of UNESCO (ICHARM) and Secretary of IFI and Prof Ali Chavoshian Director of Regional Centre for Urban Water Management Tehran under the auspices of UNESCO (RCUWM-Tehran) and Secretary of IDI. The session was co-chaired by Prof Shahbaz Khan (UNESCO, by SKYPE), Prof Tabios and Prof Tachikawa.
 - statement
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/unesco_ihp_rsc_idi_ifi_special_session_regional_delivery/#.WAreOvl97IU





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- 11 July 2016 Megacities, Water and Climate Change: Need for an Integrated Approach in Asia and the Pacific Region
 - UNESCO Office, Jakarta participated in the special session on “Megacities, Water and Climate Change: A Call to Action” organized by IHP Secretariat HQ on 11 July 2016 during the Singapore International Water Week 2016 at Marina Bay Sands Convention Centre.
 - The seminar aimed to promote the establishment of a global platform, develop resilience agenda, and build support for a critical future management of Megacities, Water, and Climate Change. It brought together key speakers such as megacity mayors and chief executives, local government officials, climate change and environment experts, heads of large water/wastewater utilities, Senior representatives from multilateral/bilateral development institutions, senior representatives from the international development banking sector, heads of academic/research/training institutions dealing with Climate Change, heads of technology companies relevant to water, wastewater, and desalination, NGOs working on water/climate change/disaster management, Community organizations active in megacity management and a number of experts from UNESCO HQ and Jakarta.
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/megacities_water_and_climate_change_need_for_an_integrated/#.WAreMvl97IU





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- 13 July 2016 UNESCO Jakarta contributed to the meetings of Regional Coordination Mechanisms on Water during the Singapore International Water Week 2016
 - UNESCO Jakarta actively participated to the meetings of two regional coordination mechanisms on water in Asia and the Pacific, namely, the 19th Governing Council Meeting of the Asia Pacific Water Forum (APWF) and the 2nd Board of Council Meeting and Special Session of the Asia Water Council (AWC) on 13 July, 2016 at Marina Bay Sands in Singapore.
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/unesco_jakarta_contributed_to_the_meetings_of_regional_coor/#.WAReLPI97IU





- 14 July 2016 Strengthening Strategic Water Planning and Management at the Singapore International Water Week 2016
 - The event was opened by an introduction and presentation of the technical reports on "Strategic Water Management: International Experiences and Practices" developed and co-published through a collaboration between ADB, GIWP, UNESCO, and WWF-UK. Director, Regional Science Bureau for Asia and the Pacific, Mr Shahbaz Khan emphasized that these technical reports have brought together international experience and recommendations on basin planning, water allocation and flood management, also draw out the lessons, principles, procedures and approaches by providing a review of international practices on fundamental issues of water management such as Strategic River Basin Planning (Vol. 1), Basin Water Allocation Planning (Vol. 2), and Flood Risk Management (Vol.3). He also announced that two additional technical reports will be produced in 2016 on 1) River Restoration: A Strategic Approach to Planning and Management and 2) Drought: A strategic risk-based approach to planning, response and recovery. After this introduction, the reports were presented to the participants who took hold of the available copies and requested further customization of these documents for their countries.



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- 21-24 July 2016 UNESCO Networks in the Field: Fostering Collaboration for Delivering 2030 Agenda
 - The objectives of this strategic coordination event were to: Discuss and elaborate strategies for fostering dialogue, cooperation, networking and sharing of knowledge as well as resources among the UNESCO field offices and its network to support the delivering of the Agenda 2030 and its SDGs through the UNESCO mandate on Natural Sciences. Discuss on a joint strategy and approach for the implementation of the Lima Action Plan for Biosphere Reserves in the Asia-Pacific region. Support interdisciplinary and interregional initiatives and develop joint proposals for Sciences projects.
 - Bali Recommendations
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/unesco_networks_in_the_field_fostering_collaboration_for_de/#.WArD__l97IU





- 26 July 2016 UNESCO, L'Oreal Indonesia and Girls Students Celebrates the Conservation of the Mangrove Ecosystem
 - In the celebration of International Day for the Conservation of the Mangrove Ecosystem on 26 July 2016, UNESCO Jakarta together with L'Oreal Indonesia invited notable women scientists, Dr. Indri Badria Adilina, Dr. Eni Sugiarti & Dr. Ai Suguira to speak before girls' students from an all-girls secondary school in Jakarta, Indonesia. The women scientist shared their learning experiences, scientific career journey and their current scientific research activities and its potential contribution in conserving mangrove ecosystem.
- http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/unesco_loreal_indonesia_and_girls_students_celebrates_th/#.WArD-fl97IU



- 10-12 August 2016 Sustainability Framework for IWRM, Water Governance, water tariffs and pricing policies in urban areas
 - in collaboration with Ramon Aboitiz Foundation Inc. (RAFI) and The Metro Cebu Development and Coordinating Board (MCDCB), UNESCO Office, Jakarta conducted an “International Workshop on Water Tariffs, Governance and IWRM for Sustainability” from 10 to 12 August 2016 in Cebu City, Philippines.
 - Principles of sustainable water tariffs and pricing (full-cost recovery, economic efficiency, equity and administrative feasibility)
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/sustainability_framework_for_iwrm_water_governance_water_t/#.WArd9PI97IU





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- 8Sept 2016 Integrated Water and Environmental Management for Water Sustainability Program in East Nusa Tenggara
 - Workshop and Stadium General for Sciences Teachers and University Students in Timor Tengah Utara District, East Nusa Tenggara Province
 - Within the framework of the project “Ecological and Eco-hydrological Solutions for Sustainable Management in Indonesia and the Asia and the Pacific Region”, and with the aim of introducing Ecohydrology as water management tools in pilot universities in Indonesia, UNESCO Office Jakarta in collaboration with University of Timor with the generous support from Indonesia-Fund-in Trust conducted the first workshop and stadium general to disseminate basic knowledge on Ecohydrology approach for water management to teachers and students in selected universities and schools in East Nusa Tenggara province.
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/integrated_water_and_environmental_management_for_water_sust/#.WArd8PI97IU



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- 8oct2016: SDG 4, 6, 17: Inauguration of the Multi-Stakeholders Partnership: Water Education in Pari Island, Kepulauan Seribu
 - UNESCO, Indonesia Global Compact Network (IGCN) through Indonesia Water Mandate Working Group (IWMWG), PT Pindo Deli Pulp & Paper Mills, Habitat for Humanity Indonesia (HFHI), and the Indonesian Institute of Sciences (LIPI) work together to increase awareness and capacity in sustaining water in Pari Island through a pilot project holistic effort to find solutions to the water crisis in the vulnerability of the island.
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/sdg_4_6_17_inauguration_of_the_multi_stakeholders_partner/#.WArdifl97IU



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- 11-12 October 2016 World Culture Forum 2016: Culture for an Inclusive Sustainable Planet
 - “Water for Life: Reconciling Socio-Economic Growth and Environmental Ethics,” discussing the role of water as the axis of life that tied together the social structure of everyday life and was therefore, fundamental to a society’s tradition and cultural identity. The symposium brought forward a number of pertinent points, some of which noting water as an important element to basic human needs and the need to reframe cultural practices within the context of socio-ecological changes, in order to address the gap between the pace of economic development and socio-ecological capacity to cope.
 - http://www.unesco.org/new/en/jakarta/about-this-office/single-view/news/world_culture_forum_2016_culture_for_an_inclusive_sustanab/#.WArd5PI97IU





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Annex 3 - Report on IHP IGC Bureau Activities

Ian White

Past Vice-Chair Region IV (Asia-Pacific)

IHP Australia

Outline

- Report on 53rd Session UNESCO IHP Bureau, Paris, 1-2 June 2015

<http://en.unesco.org/themes/water-security/hydrology/about-us/governing-bodies/documents-53rd-session-ihp-bureau>

- Items arising from the 22nd IHP Intergovernmental Council Session
- High Level International Panel on Water
- Changes to the Statutes of IHP
- Out of Session Category II Centre Proposals
- Reporting of Category II Centres & UNESCO Water Chairs to IGC
- IHP Communication Strategy

53rd Session UNESCO IHP Bureau

Key Items:

1. Mexican proposal to establish an Intergovernmental Panel on Water
**
2. Changes to the term of appointment of IHP Bureau.**
3. Out of Session Proposals for Category II Centres
4. Communication Strategy

Intergovernmental Panel on Water

- Proposal by IHP IGC Chair (Group III) to establish an Intergovernmental Panel on Water similar to IPCC – discussed at IHP Bureau Technical Meeting
- Bureau requested response from all IHP regions.

Intergovernmental Panel on Water

- Mexico subverted the process by forming the high-level panel on water (HLPW) independent of IHP with the UN-World Bank
- IHP will join as a “friend” of HLPW
- WMO involved as part of the secretariat

Changes to the Statutes of IHP

- Region I had proposed the term of Bureau be increased from 2 to 4 years
- Also a problem for appointing alternate members of the Bureau when resignations occur

Changes to the Statutes of IHP

- IHP Bureau review the Statutes and the Rules of Procedure for IHP,
- Consultation with IHP National Committees should be made. Council members further requested that such process has to be made in consultation with all IHP National Committees and focal points, involving also all delegations to UNESCO.

Out of Session Category II Proposals

- A preliminary written request of designation for the International Centre on Water and Transdisciplinarity (CIRAT), as a Category 2 Centre was submitted by the Federative Republic of Brazil.
- Not read by most Bureau members but approved
- Requested improvements to proposal
- Basically unchanged
- Proposal was not even supported by Brazil's delegation to IHP

Reporting to IHP IGC

- Some UNESCO IHP Category II Centres and UNESCO Water Chairs did not send in reports to IHP IGC at 22nd Council Meeting
- The UNESCO brand is prestigious
- UNESCO should require formal reporting to maintain UNESCO brand
- A draft resolution has been prepared on this.

Communication and Outreach Strategy

- Madam Yan Huang has prepared a presentation on this



Outreach & Communication

Updates for the 53rd Bureau of UNESCO-IHP

Outreach & Communication Committee

13 June 2016, Paris

Background

- ❑ 1996 – 2010 Council resolutions acknowledging the urgent need for a permanent post for a communications specialist
- ❑ UNESCO IOS: raise IHP profile by comms strategy, improving website, allocating resources
- ❑ 2014: Outreach and Communication Committee established by IHP Council in the 21st session. Builds on work of the Publication and Communication Committee
- ❑ 2014 Resolution XXI-2 (2014) Implementation of a communication and outreach strategy
- ❑ 2015-, implementation and actions of the strategy and plan

Background

The Council (2014) elected the following members to the Committee:

- ❑ Ms. Andrea Van der Kerk (shared with Ms Rozemarijn ter Horst, The Netherlands, Group I)
- ❑ Mr. Maciej Zalewski (Poland, Group II)
- ❑ Mr. Luis Moreno (Chile, Group III)
- ❑ Ms. Yan Huang (China, Group IV, chairperson)
- ❑ Mr. Seydina Oumar Traore (Burkina Faso, Group Va)
- ❑ Mr. Abdallah Abdelsalam Ahmed (Sudan, Group Vb)

Why Outreach & Communication?

a **key** enabler for the fulfillment of IHP's mandate, it helps to:

Increase the visibility and transparency of IHP's activities

- helps to understand the potential of IHP and participate in its activities more easily,

Share knowledge & enable cooperation

- Build water cooperation network world-widely

Strengthen connections within the IHP network

- Enhance the leading position of IHP

Increase public recognition

- Increases awareness of water and IHP work

Attract funding

- Improve capacity

Responsibilities IHP Secretariat: as presented in the strategy

- Present, on a biennial basis, a communication action plan (together with O&C Committee)
- Facilitate implementation of the strategy and communication actions, in particular through IHP website
- Enhance the division's communication capacity by communication capacity-building actions;
- Systematically collect and diffuse communication content from/to members of the IHP network,
- Establish IHP presence on social media platforms
- Contract a dedicated communication specialist on a full-time basis at the Secretariat

Fact: Insufficient due to lack of Resources in IHP!

Responsibilities IHP network - as presented in the strategy

- ❑ Undertake communication actions, incl. maintaining a website or webpage and providing relevant information for the IHP website (???)
- ❑ Systematically provide content to the Secretariat for mass diffusion, as appropriate (the Secretariat will provide templates/guidance for this)
- ❑ Actively participate in and take ownership of the platforms for communication and collaboration at their disposal.

Fact: the committee could hardly help due to the loosing formation of the committee & lacking of staffing support from IHP office.

Proposed action plan from 52nd bureau meeting

- ❑ Complete action-oriented communication plan (by O&C together with Secretariat)
- ❑ Core funding to support O&C activities made available by the Secretariat
- ❑ A dedicated communication specialist on a full-time basis at the Secretariat (resources required)
- ❑ A user friendly IHP (VIII) website
- ❑ Other actions when necessary

The importance of outreach and communication has drawn attention from the bureau and the AP region countries during the 2015 **AP-RSC meeting in Indonesia**, discussions have been made and actions were proposed (ref. Ian White)

Action 1: website

- ❑ Water website was core-maintained online and IHP substantially updated the websites on Water Security available in:
 - English (<http://en.unesco.org/themes/water-security>)
 - French (fr.unesco.org/themes/securite-aprovisionnement-eau)
 - Spanish (<http://es.unesco.org/themes/garantizar-suministro-agua>)
- ❑ Information from older web platforms are being migrated or archived.

The new Water Security website established thematic entry points based on the six IHP VIII areas and is regularly updated.



Action 2: communication plan

- ❑ IHP implemented an **action-oriented communication plan** for the 50th anniversary of the UNESCO Water Programmes, International Hydrological Decade and IHP, supported by dedicated temporary staff, including a junior communication specialist on a full-time basis.
- ❑ The reinforced team informed Member States through frequent e-mails and news items about ongoing programme activities and events, including the 50 Years celebration.
- ❑ Dedicated webpages in English, French and Spanish were cited as example for good practice by UNESCO's communication services.

Action 3: reporting

- ❑ IHP issued 32 news items reporting on activities/projects, events and publications and made them **available online**, such as information on the 50 Years celebration, the Water and Megacities conference and events as part of COP21.
- ❑ IHP has been featured on social media through the general accounts of UNESCO on **Facebook** (3 posts) and **Twitter** (15 tweets).
- ❑ Many IHP events have also been featured on Flickr through dedicated photo albums as part of the UNESCO Natural Sciences account.

Action 4: Informing IHP National Committees

- ❑ The 52nd IHP Bureau concluded that informative e-mail messages should be sent to the IHP National Committees.
- ❑ Regular notes were thus sent to the Committees and the UNESCO Water Family to inform them on activities and events of the Programme, inviting them to attend and contribute on key issues related to IHP and its further development.

Action 5: Publications

- ❑ In 2014-2015, **23 publications** were uploaded online as well as **7 videos**, **88 web news** items were also produced and released.
- ❑ A dedicated **Twitter account** managed by the Secretary of IHP has 130 tweets and 96 followers.

In Oct-Nov 2015, the general freshwater website received 15792 visits with 39891 page views. The IHP website received 2484 visits with 9187 page views.

Challenges & lessons learnt

- ❑ Lack and movement of staff, caused delays in implementing the draft Communication and Outreach Strategy and in establishing a regular informative e-mail circular to IHP Council members;
- ❑ Close collaboration with the Natural Science Sector's communication team helped establish solutions and substantial enhancements of IHP's communication and outreach activities.

Suggestions

- ❑ Take cost effectiveness measures included the **use of temporary staff** to respond to the need for communication personnel.
- ❑ **Close collaboration** with partners and other UNESCO **Water Family Members** and **category II centers** for increased communication output and multiplier effects.

Outcomes from the 53rd Bureau meeting

- ❑ The bureau encouraged the secretariat implement the Communication and Outreach Strategy developed jointly by the committee and secretariat;
- ❑ The bureau requested the secretariat to strengthen direct communication with the delegations, updating them on IHP activities, reinforce the communication by and with the IHP national committee in the context of the upcoming 22nd IHP council meeting, and to increase the visibility of the scope of services of the secretariat.
- ❑ The bureau further decided to maintain the committee (4-year functioning period).

Expectations from the council

Draft Resolution

- ❑ **Invites** the Secretariat, supported by the Communication and Outreach Committee, to set **milestones** for the implementation of the Communication and Outreach Strategy to be presented to the 54th Bureau meeting and reported on in the next Bureau and Council meetings, and to update the strategy every 4 years with new action plans;
- ❑ **Requests** the Secretariat to **further strengthen** the implementation of the most important outreach and communication activities such as updating the IHP website and to send, at least on a quarterly basis, an update on relevant activities to the UNESCO Water Family;
- ❑ **Requests** the Member States, the UNESCO Water Family, IHP flagship initiatives and programmes and in particular National IHP Committees to actively contribute to this outreach.



Thanks!

Report of the 22nd session of the
Intergovernmental Council
June 13-17, 2016

Ian White and Yasuto Tachikawa

Election of the Chairperson and Vice-Chairpersons

- The Council elected Mr András Szöllösi-Nagy (Hungary, Group II – Eastern and Central Europe) as Chairperson of the Intergovernmental Council of IHP.
- The Council elected the following Vice-Chairpersons: Mr Helmut Habersack (Austria, Group I);
Mr Yasuto Tachikawa (Japan, Group IV),
Mr Cheikh Becaye Gaye (Senegal, Group Va), and
Mr Mahmoud Abu-Zeid (Egypt, Group Vb).
Mr David Korenfeld Federman, the outgoing
Chairperson of IGC, Mexico, Group III).

Election of the Committee Members from Group IV

- The Council were elected to the IHP Resolutions Drafting Committee: Mr Ignasius Dwi Atmana Sutapa (Indonesia, Group IV).
- The Council elected the members to the IHP Finance Committee: Mr Hanwoo Kang (Republic of Korea, Group IV) .
- Ms Yan Huang, Chairperson (China , Group IV) of the IHP Communication and Outreach Committee until the end of the 23rd session of the IHP Council.

INSTITUTIONAL DEVELOPMENTS AT UNESCO

- Report on the consultation regarding the establishment of an Intergovernmental Panel on Water

The Council opposed the creation of such a panel within IHP, stressing that IHP should remain committed to its original mandate, as an intergovernmental scientific programme on water, and noting that two high-level panels on water have already been established at higher levels.

INSTITUTIONAL DEVELOPMENTS AT UNESCO

- Report of the IHP Communication and Outreach Committee

Ms Yan Huang, Chairperson of the Committee, presented the report of its activities and stated that while communication and outreach were key enablers for all activities of IHP and the UNESCO Water Family, it was necessary to raise the visibility of IHP, especially among the younger audiences. She proposed elements to induce the required development of IHP's communication and outreach in the Committee's related Draft Resolution XXII-3, Implementation of the Proposed IHP Communication and Outreach Strategy.

INSTITUTIONAL DEVELOPMENTS AT UNESCO

- Report on the celebration of the 50th anniversary of the UNESCO water programmes

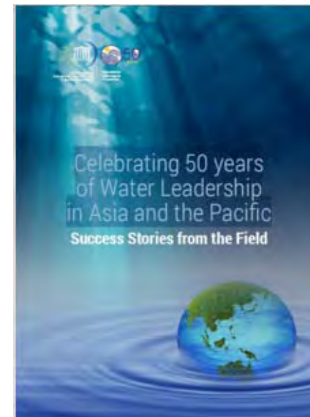
The successful celebrations of the anniversary in Group IV through the 22nd IHP-Regional Steering Committee for Southeast Asia and the Pacific (IHP-RSC SEAP) was reported by Prof Takara. A book was produced, which presented IHP activities in the region and 10 distinguished scientists were recognised for their work in hydrology in the region.

Implementation of IHP-VIII and Regional perspectives

- Mr Shahbaz Khan reported progress and achievements on the implementation of IHP VIII in Asia and the Pacific Region.
- Mr Tachikawa, the Vice-Chairperson from Group IV, reported that the Group has developed the Catalogue of Rivers from Southeast Asia and the Pacific; and it is now developing a new catalogue of hydrologic analysis (CHA). An IFI-IDI joint meeting was organized at ICWRER2016.
- Representatives from the UNESCO Secretariat presented examples of cooperation between the IHP and MAB, Man and the Biosphere Programme, and International Geoscience and Geoparks Programme (IGGP), the Management of Social Transformation (MOST) and Bioethics Programmes of the Social and Human Sciences Sector (SHS), and the Intergovernmental Oceanographic Commission (IOC).

Fostering UNESCO Water and Environment Networks in the Asia-Pacific Region

- **The 23rd IHP Regional Steering Committee for Southeast Asia and the Pacific (RSC-SEAP) 19-22 October 2015 in Medan, Indonesia.**
 - UNESCO International Symposium on "Integrated Actions for Global Water and Environmental Sustainability" and the 23rd meeting of the IHP-RSC SEAP.



- **Regional and Interregional Science Cooperation Meeting for Asia and the Pacific (IHP and MAB networks) 21-24 July 2016 in Bali, Indonesia**
 - Bringing together IHP and MAB networks in the region for Science exchange and cooperation in Asia and the Pacific region.

Centres under the auspices of UNESCO

- **UNESCO-IHE Institute for Water Education (category 1)** : The Chairperson of the Council indicated that the question was whether or not UNESCO-IHE would remain a category 1 institute. On the one hand, he noted that if UNESCO-IHE becomes a category 2 centre, this would certainly reduce the impact of the Institute's activities. The Chairperson concluded that he believes that the two positions could be reconciled with some flexibility, and he summarised the situation by stating that the Council is for UNESCO-IHE to continue.
- **53rd Meeting of UNESCO IHP Bureau, Paris, 19-21 April 2016** : A sunset clause is required so that the UNESCO logo can be removed from Centres that are no longer contributing. This has to be done at the UNESCO General Council Level. Requesting Permanent Delegations to consider introducing sunset clauses to Category II centres would promote efficiency and focus on core goals.

NATIONAL REPORT ON IHP RELATED ACTIVITIES AUSTRALIA

1. ACTIVITIES UNDERTAKEN IN THE PERIOD November 2015 to October 2016

Australia was elected to the IHP Intergovernmental Council in Nov 2011 and ceased in June 2016 . Ian White was Vice President of the InterGovernmental Council of IHP, representing Asia-Pacific from June 2014 to June 2016.

1.1 Meetings of the IHP National Committee

IHP activities in Australia are carried out under the guidance of the national UNESCO Science and Technology Network. In order to facilitate the implementation of UNESCO activities in Australia and the region, a national IHP Australian Network was established in 1995 and this network acts as the IHP National Committee for Australia. There are no formal meetings of the IHP Australian Network. Activities are conducted largely between the members by telecommunications (e-mail). The Australian National Commission (NATCOM) for UNESCO (www.dfat.gov.au/intorgs/unesco) currently has 6 members. The Priorities of NATCOM include:

- Attaining quality education for all and lifelong learning;
- Mobilizing science knowledge and policy for sustainable development;
- Addressing emerging social and ethical challenges;
- Fostering cultural diversity and intercultural dialogue; and
- Building inclusive knowledge societies through information and communication

1.1.1 Decisions regarding the composition of the IHP National Committee

The IHP Australian Network includes the following members. Summary details of all current members are listed below. Dr Dasarath Jayasuriya is the principal focus point for the National committee.

Name	Expertise	Organization
Dasarath Jayasuriya	Flood and Seasonal Forecasting	Bureau of Meteorology
Tony Falkland	Island Hydrology	University of Adelaide
Trevor Daniell	Urban, Low and High Flow Hydrology	
Quentin Grafton	UNESCO Chair in Water Economics and Transboundary Water Governance	Australian National University
Tariq Rana	Hydrology, Water Policy and Planning	MDBA
Peter Martin	Public Relations	
Ian White	Hydrology/Water Quality	Australian National University
Jeff Camkin	Ecohydrology	University of Western Australia
	HELP Coordination	Centre for Excellence for Ecohydrology
Ian Cordery	Flood/Drought Hydrology	University of New South Wales
Peter Dillon	Groundwater	CSIRO Land and Water
Anne Jensen	Ecotones	Wetlands Care Australia
Ray Volker	Groundwater	University of Queensland

1.1.2 Status of IHP-VIII activities

The IHP Australian Network brings together many of the key hydrological research groups within Australia. As such, Australia is able to contribute towards IHP activities through the research

programs currently existing in Australia. A description is provided below of some activities pertinent to IHP-VIII.

As yet all the activities being carried out in Australia have yet to be mapped against IHP VIII Themes.

The Australian Bureau of Meteorology and CSIRO Water Information Research and Development Alliance (WIRADA) undertakes research of direct relevance to the activities of the IHP.

Theme 1: Water-Related Disasters and Hydrological Change

Theme 2: Groundwater in a changing environment

Theme 3: Addressing Water Scarcity and Quality

Theme 4: Water and human settlements of the future

Theme 5: Ecohydrology, engineering harmony for a sustainable world

Theme 6: Water Education, key for Water Security

WIRADA's science program underpins a number of activities that support the provision of national water information. These include:

- a national water information system (AWRIS) to collect and hold water data from formerly disparate sources that helps to standardise, organise, and deliver high quality national data and information to end-users
- periodic assessments of the status of water resources in Australia
- the annual National Water Accounts (NWA)
- water forecasting and prediction services.

Australia faces major challenges in ensuring sustainable water supply in the face of extremely variable and changing climate and rising demand for water. In response, the Australian Government's initiative, Water for the Future (<http://www.environment.gov.au/water/australia/index.html>) is built on four key priorities of:

- taking action on climate change
- using water wisely
- securing water supplies and
- supporting healthy rivers.

Theme 1: Water-Related Disasters and Hydrological Change

Focal Area 1.1: Risk management as adaptation to global changes

Focal Area 1.2: Understanding coupled human and natural processes

Focal Area 1.3: Benefiting from global and local Earth observation systems

Focal Area 1.4: Addressing uncertainty and improving its communication

Focal Area 1.5: Improve scientific basis for hydrology and water sciences for preparation and response to extreme hydrological events

A subset of the hydrological data collected by the State and Territory water agencies and the Bureau of Meteorology is contributing to international data centres for use in global and regional studies.

The Indian Ocean Climate Initiative (IOCI) (<http://www.ioci.org.au>), a partnership of research organisations, is researching the impact of climate variability and climate change on the water resources of the southwest region of Australia. CSIRO (<http://www.csiro.au/>), Australia's national research organisation, has research programs addressing global and regional climate change, climate change impacts on natural resources including water and climate change adaptation strategies.

The Climate and Oceans Support Program in the Pacific (COSPPac, <http://cosppac.bom.gov.au/>), is a major initiative of the Australian Government to support Pacific Island countries to adapt to and mitigate the impacts of climate variability and change. Its aim is to enhance the capacity of Pacific Islands to manage and mitigate the impacts of climate variability and change and tidal

events and sea level rise. COSSPac is implemented by the Bureau of Meteorology and is carried out in partnership with the Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Niue, Nauru, Papua New Guinea, Palau, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu as well as with Australian Government Department of Foreign Affairs and Trade, Geoscience Australia, the the Pacific Community (SPC) and Secretariat of the Pacific Regional Environment Programme (SPREP).

Australian National University (ANU) together with Pacific Hydrological Services (PHS) have been researching vulnerability and adaptation to global change in small island countries and have contributed to AusAID's Pacific vulnerability and adaptation project. The ANU, GHD and the University of Adelaide have been investigating the vulnerability of water supply catchments in the Australian Capital Territory to global change.

ANU together with UNICEF has been investigating drought preparedness and response in the western Pacific region in response to the record 2015-16 El Niño events and subsequent intense tropical cyclones.

ANU together with the Kingdom of Tonga's Ministry of Meteorology, Information, Disaster Management, Climate Change, Environment, Climate Change and Communications and the The German Aerospace Center (DLR) have been assisting the Government of Tonga in developing a national Science, Technology and Innovation Policy. A key focus of the framework is adaptation and disaster response.

A number of major programmes will be highlighted in detail later.

WIRADA brings together CSIRO's research and development expertise in water and information sciences and the Bureau of Meteorology's operational role in hydrological analysis and prediction. The Alliance has covered fields of data interoperability, hydrologic modelling, water accounting and water resource assessment. The Water data transfer standards project is defining and developing transfer standards and procedures for supply of specified data from water information providers and has contributed significantly to the development of an international data exchange standard named WaterML. Among the other significant contributions has been in improving the seasonal streamflow forecasting area using the Bayesian Joint Probability method which has been operationalised using the Bureau operational systems and now well accepted in the industry, One further development is the Australian Hydrological Geospatial Fabric which is a specialised Geographic Information System (GIS). This identifies the spatial relationships of important hydrological features such as rivers, lakes, reservoirs, dams, canals and catchments and makes working with geodata in a hydrological context much easier.

Theme 2: Groundwater in a changing environment

Focal Area 2.1: Enhancing sustainable groundwater resources management

Focal Area 2.2: Addressing strategies for management of aquifers recharge

Focal Area 2.3: Adapting to the impacts of climate change on aquifer systems

Focal Area 2.4: Promoting groundwater quality protection

Focal Area 2.5: Promoting management of transboundary aquifers

The National Centre for Groundwater Research and Training (<http://www.groundwater.com.au>) has an extensive research program including research on groundwater/surface water interaction and is investigating how better to manage groundwater resources. CSIRO is researching use of aquifer storage and recovery with urban stormwater and recycled water to sustain depleted groundwater resources (www.clw.csiro.au/research/urban/reuse). The ANU is researching artesian groundwater processes and modelling of groundwater changes in the lower Great Artesian Basin and in south eastern Australia.

ANU, with PHS, are investigating shallow groundwater recharge and harvesting, socio-cultural aspects of groundwater management, water policy development and impacts of climate variability in low coral islands as a follow up to a UNESCO-IHP initiated project. Hydrological extremes in sensitive and stressed biomass and hydroclimatic zones are being researched in small island developing states.

Global change and feedback mechanisms of hydrological processes in stressed environments.

- The Murray Darling River Basin and GEWEX related research activities

Changing global dynamics in aquatic environments: degrading ecosystems, especially those susceptible to sea level change, coastal sediment balance and pollutant accumulation.

- *Crosscutting Program Components – FRIEND and HELP*

Collaboration in the Asian Pacific FRIEND project by provision of data, hosting a node of the Internet based Water Archive, and assisting in research activities. HELP basins include the Lower Murrumbidgee catchment in the Murray Darling River Basin (coordinated by Awadesh Prasad, Murray Darling Basin Authority), Tully Basin (coordinated by Jim Williams, CSIRO), Lower Burdekin River Basin (coordinated by Keith Bristow, CSIRO), Fitzroy River basin (coordinated by Chris Carroll, Queensland Department of Environment Resources and Mines) and the Ord River Basin (coordinated by Jeff Camkin University of Western Australia and Dick Pasfield). Overall coordination in Australia is through Prof. Jeff Camkin, University of Western Australia.

Theme 3: Addressing Water Scarcity and Quality

Focal Area 3.1: Improving governance, planning, management, allocation, and efficient use of water resources

Focal Area 3.2: Dealing with present water scarcity and developing foresight to prevent undesirable trends

Focal Area 3.3: Promoting tools for stakeholders involvement and awareness and conflict resolution

Focal Area 3.4: Addressing water quality and pollution issues within an IWRM framework - improving legal, policy, institutional, and human capacity

Focal Area 3.5: Promoting innovative tools for safety of water supplies and controlling pollution

An AusAID project has been approved to facilitate development of water quality guidance for managed aquifer in India. UNESCO Delhi office is assisting in project establishment.

An IAH Commission on MAR project has commenced to produce a monograph on clogging in MAR and the international publication is being led by an Australian editorial team from AGT and CSIRO. This addresses an important constraint on the effectiveness of recharge enhancement.

Non-conventional water resources: brackish water use and waste water re-use.

- A major new research project on storing wetland treated stormwater in a brackish aquifer for recovering potable water. This will be an icon project with much on HACCP that will be transferable to developing countries. This now has partners in China, India and Singapore.
- Free exchange of information from Australian Water Conservation Reuse Research Program and UNESCO (<http://www.clw.csiro.au/publications/awccrp/>)

Access to water for food security in environmentally stressed zones.

The National Land and Water Resources Audit (<http://www.nlwra.gov.au/>) and http://audit.ea.gov.au/ANRA/atlas_home.cfm) and the Water and the Economy study have produced a considerable body of data and information about the value, use, distribution and quality of water within Australia.

Research on property rights of water and the structure, operations and social and economic impacts of water trading markets continues to receive a lot of attention in Australia and is a potential resource for similar projects in other countries. The ANU, the French agency CIRAD and PHS has undertaken research on the use of multi agent systems and companion modelling to support negotiations and reduce conflict over groundwater use in low atolls.

Theme 4: Water and human settlements of the future

Focal Area 4.1: Game changing approaches and technologies

Focal Area 4.2: System wide changes for integrated management approaches

Focal Area 4.3: Institution and leadership for beneficiation and integration

Focal Area 4.4: Opportunities in emerging cities in developing countries

Focal Area 4.5: Integrated development in rural human settlement

Culture, ethics and legislation for wise stewardship of water.

- Indigenous water knowledge and understanding
- Pacific Island countries culture and water issues
- A framework for integrating water policy for managed aquifer recharge into water resources management was developed and is being taken up by those states where the need is most pressing (<http://www.nwc.gov.au/publications/waterlines/robust-policy-design-for-managed-aquifer-recharge>)

Good Governance, capacity development and stakeholder participation. Empowerment of human resources.

- CSIRO with NCGRT and IceWARM are providing training on MAR (management of aquifer recharge) including technical aspects, management policies and guidelines for health and environment protection
- Frameworks for determining sustainable yield of aquifers

CSIRO and SKM are each developing a thematic paper on groundwater governance for GEF-FAO (on groundwater recharge/discharge and aquifer equilibrium and on surface water-groundwater interaction, respectively)

- French-Australian Initiative on Water and Land Management through the UNESCO Chair in Water Economics and Transboundary Water Governance at ANU conducted “Food and Water Security shaping Land-use Futures” 12-14th June 2013 which has developed a continuing program of research on relevant issues in this focal area.

Affordability, poverty alleviation and assured financing, for effective IWRM. Include ‘water’ in national PRSP’

- Implementation of IWRM in the Pacific Island Countries (assistance to SOPAC)
- Australian National Water Initiative

Shared Water resources and conflict

- Water markets and water trading approaches
- International exchange of data

As a result of a National Water Initiative (NWI) agreed by Australian federal and state governments all Australian water agencies are required to develop comprehensive water management plans. The plans are being developed through a process of extensive stakeholder consultation and watershed modelling. The process being employed and the resultant plans provide a valuable resource for similar projects elsewhere in the world.

The WIRADA water resources assessment and water use accounting project is developing methods and technologies, to enable the Bureau to provide integrated surface and groundwater resource assessments, water accounts and water resource outlooks. The first 5 year agreement finished in 2012 and was extended for a period of 3 more years

Theme 5: Ecohydrology, engineering harmony for a sustainable world

Focal Area 5.1: Hydrological dimension of a catchment – identification of potential threats and opportunities for a sustainable development

Focal Area 5.2: Shaping of the catchment ecological structure for ecosystem potential enhancement – biological productivity and biodiversity

Focal Area 5.3: Ecohydrology system solution and ecological engineering for the enhancement of water and ecosystem resilience and ecosystem services

Focal Area 5.4: Urban Ecohydrology – storm water purification and retention in the city landscape, potential for improvement of health and quality of life

Focal Area 5.5: Ecohydrological regulation for sustaining and restoring continental to coastal connectivity and ecosystem functioning

Australia is developing policy and programs to support ecosystem enhancement through ecosystem service production

Australia has three UNESCO Ecohydrology Program Demonstration sites (Ord River, Western Sydney and water planning in Australia, with all three featured in the 2012 UNESCO document “Ecohydrology for Sustainability”).

The ANU and PHS have ongoing projects in conjunction with UNESCO-IHP investigating shallow groundwater recharge, water quality, impacts of land-use and extraction and socio-cultural aspects of groundwater management and impacts of drought in low coral islands. The ANU together with NSW Department of Primary Industry has been investigating estuary policy and management strategies to improve the health of estuaries. Research into hydrological process in and the sustainable management of wetlands is being undertaken in a number of universities and eWater Cooperative Research Centre and the ANU in conjunction with UNSW and the NSW Sugar Industry has been investigating the use of constructed wetlands to treat drainage from farm lands. The urban environment and water sensitive urban design are also areas of current research.

The Bureau has been given a new responsibility under the *National Plan for Environmental Information*, which is the first step on a long-term commitment to reform Australia’s environmental information base and build this critical infrastructure for the future. It is initially a four-year program, and the first phase is a joint initiative between Commonwealth Department of Sustainability, Environment, Water, Population and Communities and the Bureau. The needs driving this initiative include looking at prioritising of investments in Natural Resource Management, identifying and predicting the impact of climate change, understanding environmental management decision impacts on the economy and society, activation of markets for environmental goods and services, improvement of the quality and transparency of environmental assessments for major projects and driving more sustainable resource management.

Theme 6: Water Education, key for Water Security

Focal Area 6.1 - Enhancing tertiary water education and professional capabilities in the water sector

Focal Area 6.2 - Addressing vocational education and training of water technicians

Focal Area 6.3 – Water education for children and youth

Focal Area 6.4 – Promoting awareness of water issues through informal water education

Focal Area 6.5 – Education for transboundary water cooperation and governance

Many universities and other research centres have educational and training programs. Some of the research centres are listed separately below.

National Centre for Groundwater Research and Training (<http://www.groundwater.com.au>)

The purpose of the centre is to provide research, education and specialist services for Australian and International land and water industries with the objective of improving the management of resources affected by groundwater processes.

Centre for Environmental Applied Hydrology (<http://www.civag.unimelb.edu.au/ceah>)

The Centre for Environmental Applied Hydrology is a research centre within the Departments of Civil and Environmental Engineering and Geography and Environmental Science at the University of Melbourne. Specific expertise covers all aspects of surface and groundwater hydrology, hydraulics and geomorphology.

Fenner School of Environment and Society, Australian National University (<http://cres.anu.edu.au>) conducts research and postgraduate training in spatial-temporal variability and characterisation of climate, integrated catchment management, groundwater modelling and hydrology, floods and droughts, coastal hydrology and land use, salinity, cultural and indigenous water issues, water and land policy and related socio-economic interactions, ecological economics.

The International Centre of Excellence in Water Resource Management (ICE WaRM) (<http://www.icewarm.com.au/>) is made up of a consortium of universities and has a strong focus on education and training. It promotes itself to international water resource management students to further their education in Australia and is also developing online courses for delivery in Australia and overseas.

International Water Centre (www.watercentre.org/) is a joint venture between University of Queensland, Griffith University, Monash University, University of Western Australia, International RiverFoundation, Moreton Bay and Catchments Partnership and the Queensland Government. The Centre aims to take Australia's expertise in whole of water cycle management to organizations in the rest of the World through Applied Research, Education and Training and Knowledge Services.

Professor David Waite, Director of the Centre for Water and Waste Technology & Dr Ashish Sharma, from School of Civil & Environmental Engineering at UNSW, are collaborating with Hohai University of Nanjing to develop joint research & Masters' level training programs in WATER MANAGEMENT through the Australia China Consortium for Water Research (ACCWR)

- The University of Western Australia has entered into a Memorandum of Understanding with the International Centre for Coastal Ecohydrology (under the auspices of UNESCO). Prof. Jeff Camkin, who coordinates HELP in Australia, has designed and delivered new components of the Erasmus Mundus MSc in Ecohydrology course in 2010, 2011, 2012. These courses have involved UNESCO HELP network participants from Australia, New Zealand, Malaysia, Philippines, France, Portugal, Spain, providing a bridge between UNESCO Ecohydrology and HELP programs and basins.

- *Crosscutting Program Components – FRIEND and HELP*

Collaboration in the Asian Pacific FRIEND project by provision of data, hosting a node of the Internet based Water Archive, and assisting in research activities. Australia currently has five UNESCO-IHP HELP basins (Ord, Murray Darling, Fitzroy (QLD), Burdekin and Tully). Further details are below.

1.2 Activities at a national level in the framework of the IHP

1.2.1 National/local scientific and technical meetings 2015/16

The 36th Hydrology and Water Resources Symposium was held in Hobart, Tasmania from 7-10 December 2015. This event, hosted by Engineers Australia and its National Committee on Water Engineering, is Australia's leading symposium devoted to hydrology and water resources Website: <http://www.hwrs2015.com/>

- WASH Futures 2016, Pathways to universal and sustained water, sanitation and hygiene was held in Brisbane Australia from 16-20 May 2016. <http://www.watercentre.org/news/wash-2016-conference>
- OZWATER'16, Water: For Liveable Communities and Sustainable Industries was held in Melbourne from 10-12 May 2015, <http://www.ozwater.org/conference> .
- 56th Floodplain Management Association Australia National Conference was held in Nowra, NSW on 17 – 20 May 2016, <http://www.floods.org.au/site/2016-nowra>
- STORMWATER 2016, the 4th National Conference convened by Stormwater Australia, was held on Monday, 29th August to Friday, 2nd September, 2016 at the Surfers Paradise, Queensland; <http://www.stormwater2016.com.au/>

- The 19th 2016 International Rivers *symposium* was held in New Dehli, India from 12-14 September 2016, <http://riversymposium.com/>
-
- A number of meetings of the National Committee on Water Engineering, Institution of Engineer’s have been held during this period. Some of the key purposes of these meetings are to coordinate and organise hydrology and water resources symposia and conferences, to coordinate the ongoing revision to the national hydrological design guidelines Australian Rainfall and Runoff, prepare Position Papers on key hydrological issues and to manage the publication of Australian Journal of Water Resources. Position Papers are now all available on the Institution of Engineers, Australia web site: <http://www.eng.newcastle.edu.au/~ncwe/ncwePosPaper/ppHome.htm>).

1.2.2 Research/applied projects Pacific Islands.

1.2.2.1 The 2015/16 El Niño Event

The Pacific is a key element in the Earth’s water and energy cycles and supplies 75% of the world’s tuna stock. The recent record-breaking major El Niño event (Figure 1) had major impacts across countries in the Pacific region. Sea surface temperature anomalies in the central eastern Pacific rose to record levels causing increased rainfall in central equatorial countries.

Based on the strength of ENSO indices and previous strong El Niño events it was predicted that Pacific countries in the southwestern Pacific, particularly Solomon Islands, Vanuatu and Fiji would experience severe water stress (Figure 2).

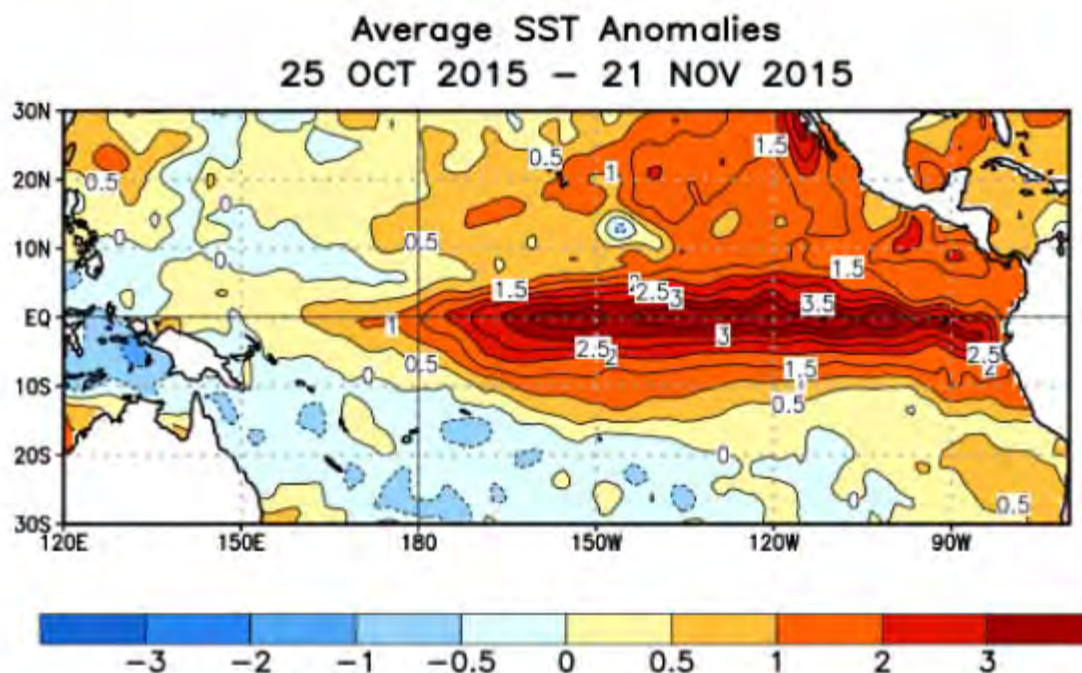


Figure 1. Average Pacific sea surface temperature (SST) anomalies for the 4 week period from 25 October to 21 November 2015 (http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf).

Analysis revealed a very complex dependence of rainfall throughout these countries on ENSO Indices, with intense El Niño events not always leading to drought condition either within one country or across the region. The analysis revealed that communities solely dependent on rainfall harvesting are highly vulnerable to even short dry periods. Small roof catchment areas, inadequate guttering, smaller capacity tanks and large household sizes can mean that a period as short as 10 days without rain can lead to severe water shortages.

Agricultural and hydrological droughts are normally considered to be slowly developing situations, however that is not the case when island communities are solely dependent on rainwater harvesting. This means that monthly or three monthly analyses of rainfall deficits are insufficient to identify the most vulnerable communities. Instead daily or weekly analyses are needed. The work also recommended that alternate water sources, such as groundwater, were also required.

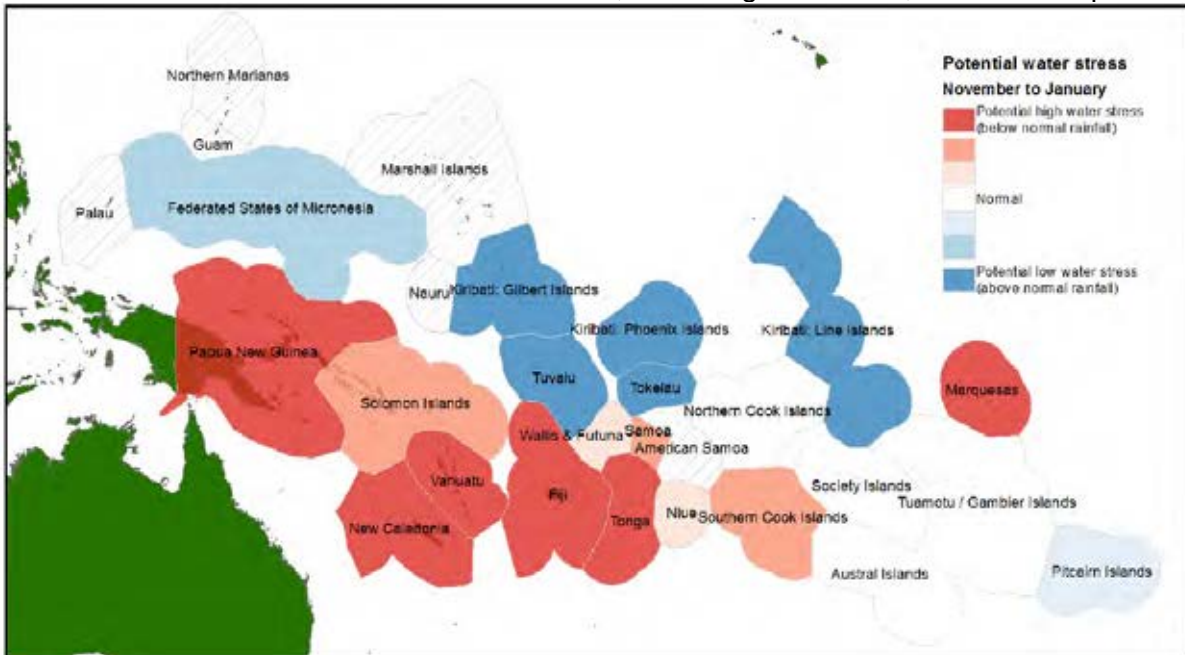


Figure 2. Forecast potential water stress, based on projected rainfall from ENSO indices, for the period November 2015 to January 2015. Solomon Islands, Vanuatu and Fiji are all forecast to have below normal rainfalls. Solomon Islands is forecast to have water stress while Vanuatu and Fiji are forecast to have high water stress. (https://www.niwa.co.nz/sites/niwa.co.nz/files/Water_Watch_182_NDJ.PDF)

It has been proposed that rising sea surface temperatures are expected to result in increasing rainfalls in Pacific Island countries. While this is true for countries in the central equatorial Pacific, study revealed that it is not the case in countries close to the normal position of the Pacific Warm Pool, where there is a very complex seasonal analysis of rainfall on sea surface temperature.

1.2.2.2 Water Policy and Planning Development

Faced with the complexity and uncertainty of future climates in the Pacific Barnett (Barnett, J. (2001). Adapting to Climate Change in Pacific Island Countries: The Problem of Uncertainty, World Development, 29 (6): 977-993. Barnett, J. (2005). Titanic states? Impacts and responses to climate change in the Pacific Islands. Journal of International Affairs, 59 (1): 203–219) concluded that the only rational adaptation strategy in the Pacific is to:

- develop the general capacity of a society to cope with change by building up its institutional structures and human resources while
- maintaining and enhancing the integrity of ecosystems
-

The building up of institutional structures includes the development of national water and sanitation policy and implementation plans. Previously Australian IHP has assisted the governments of the Republic of Kiribati and the Republic of Nauru to develop national water, sanitation and hygiene policy and implementation plans.

In collaboration with the Applied Geoscience and Technology Division of the Secretariat of the Pacific Community, SPC, under the GEF Funded Pacific Islands Integrated Water Resource Management Program, Australian IHP Committee has assisted the government of Solomon Islands through its National Intersectoral Water Coordination Committee to develop its National Water and Sanitation Policy and Implementation Plan. These were submitted to the Solomon Island Government in June 2016.

The Pacific region faces many major scientific and technological challenges, especially those associated with climate change, climate variability, development and sea level rise. There is an absence of national and regional policies on Science, Technology and Innovation in the Pacific. AMU together with the Kingdom of Tonga's Ministry of Meteorology, Information, Disaster Management, Climate Change, Environment, Climate Change and Communications and the The German Aerospace Center (DLR) have been assisting the Government of Tonga in developing a national Science, Technology and Innovation Policy. A key focus of the framework is adaptation and disaster response.

1.2.2.3 Water Supply Improvements, Kiritimati (Christmas Island), Republic of Kiribati

Water Supply Improvements, Kiritimati (Christmas Island), Republic of Kiribati

Kiribati consists of 33 islands scattered across 5 million km² with a population of about 100,000 living in 20 low-lying coral atolls and islands. It is a least developed country with a GDP per capita of about US\$1,300.

Kiritimati (Figure 3) is the largest coral atoll in the world with a total area of about 640 km². About 60% of this area is land while the remainder consists of lagoons. Kiritimati comprises 70% of the total land area of Kiribati and is the second most populated island in the nation with a growing population of about 6,000 (2010 Census). The Government of Kiribati has designated Kiritimati as the main potential growth island in Kiribati. As a result of the government's strategy, Kiritimati population growth forecasts predict an annual growth rate of 8%.



Figure 3. Satellite image of Kiritimati atoll, Kiribati.

Kiritimati is located within the equatorial dry zone of the Pacific Ocean and its climate is dominated by long drought periods associated with La Niña periods and high rainfall periods associated with El Niño events. The mean annual rainfall is just less than 1,000 mm and the coefficient of variation, CV, of annual rainfall is 0.72, which is very high. The average annual rainfall is lower and more variable than on other populated Pacific Island countries. Most other Pacific Island countries have average annual rainfalls between 1,500 mm and 3,000 mm and CV's of annual rainfall between 0.15 and 0.25.

The freshwater resources of Kiritimati consist of groundwater and limited rainwater. The fresh groundwater occurs as 'freshwater lenses' which are fresh groundwater aquifers overlying seawater. These freshwater lenses have formed in favourable locations under the surface of the

atoll. The soils are too permeable to support any fresh surface water resources. The current Kiritimati Improved Water Supply Project, funded by the European Union and managed by the Water and Sanitation Programme of SPC, and involving Island Hydrological Services is focused on water supply improvements for the second largest village of London and a nearby settlement Tennessee. The overall objective of the Project is to improve livelihoods and enable human, social and economic development on Kiritimati Island.

Main activities of this project are:

- Install, rehabilitate and operate monitoring bores for the freshwater lenses used to supply London and Tennessee and revise assessments of sustainable yields.
- Undertake urgent improvement works to the existing water supply system, including rehabilitation of infiltration galleries and solar and wind powered pumps, install flow meters and refurbish water disinfection facilities.
- Undertake detail design work of the proposed water supply upgrade works and construct new facilities (including infiltration galleries, pipeline, storage tanks).
- Provide training to local water supply personnel in water supply system management, operation and maintenance and in vital water monitoring activities.
- Implement consumer education and awareness regarding the wise use of the limited available water resources.

1.2.3 Hydrology for Environment, Life and Policy (HELP)

Australia continues to contribute to the projects established under the HELP banner: the Lower Murrumbidgee catchment in the Murray Darling River Basin (coordinated by Awadesh Prasad, Murray Darling Basin Authority), Tully Basin (coordinated by Jim Williams, CSIRO), Lower Burdekin River Basin (coordinated by Keith Bristow, CSIRO), Fitzroy River basin (coordinated by Chris Carroll, Queensland Department of Environment Resources and Mines) and the Ord River Basin (coordinated by Jeff Camkin University of Western Australia and Dick Pasfield). Overall coordination in Australia is through Prof. Jeff Camkin, University of Western Australia.

Prof. Jeff Camkin was an invited keynote presenter at the IHES/UNESCO Symposium Restoring Rivers for Future, South Korea (April 2011) and invited member of the Steering Committee for the UNESCO-IHP HELP 2nd International Symposium Building Knowledge Bridges for a Sustainable Water Future in Panama, November 2011.

The HELP Program, and HELP network participants from Australia and other countries, has featured in new modules developed for the Erasmus Mundus MSc in Ecohydrology delivered at the University of Algarve through a collaboration between the International Centre for Coastal Ecohydrology (under the auspices of UNESCO), the UWA and Technical University of Lisbon.

Activity in the Murray Darling HELP Basin has focussed on the development of a Basin plan, the largest ever water reform in the Murray Darling Basin.

1.2.4 Collaboration with other national and international organizations and/or programmes

Former President of the WMO Commission for Hydrology Network, Mr Bruce Stewart provided a link between the UNESCO IHP and WMO's Operational Hydrology Programme. Mr Tony Falkland and Prof Ian White are members of the Water Working Group of the Science, Technology and Resources Network of the South Pacific Applied Geoscience Commission. Prof Ian White is a member of the Asian Pacific Association of Hydrology and Water Resources. Mr Trevor Daniell is the past Chairman of the FIGCC and was editor of the FRIEND 2014 Conference papers. Dr Peter Dillon chairs the IAH Commission on Managed Aquifer Recharge. University of Western Australia has entered into a Memorandum of Understanding with the International Centre for Coastal Ecohydrology (under the auspices of UNESCO). Prof. Jeff Camkin, who coordinates HELP in Australia, has designed and delivered new components of the Erasmus Mundus MSc in Ecohydrology course in 2010 to 2015 and further work is being developed under the MoU.

1.2.5 Major activities of BoM

The National Water Report is Australia's most comprehensive water information report and the report for 2014-2015 was released in August 2016 (<http://www.bom.gov.au/water/nwa/2015/>). The 2015 Account, for the year 1 July 2014 to 30 June 2015, provides a set of water accounting reports for ten nationally significant water resource management regions. Adelaide, Burdekin, Canberra, Daly, Melbourne, Murray–Darling Basin, Ord, Perth, South East Queensland and Sydney. National overview highlights broad trends and findings across the ten National Water Account regions.

With near-El Niño conditions in place in the Pacific Ocean in the spring of 2014, daily maximum temperatures reached new record highs in many parts of the country. During March 2015, there was a notable heatwave across northern and central Australia, and these high temperatures increased the potential for higher-than-normal evaporation and rapid depletion of soil moisture. The low rainfall and high temperatures had a substantial impact on streamflow and most of the Bureau of Meteorology's Hydrologic Reference Stations had average or below-average streamflow. Groundwater levels have variable results reflecting the spatial variability of rainfall recharge and groundwater extraction.

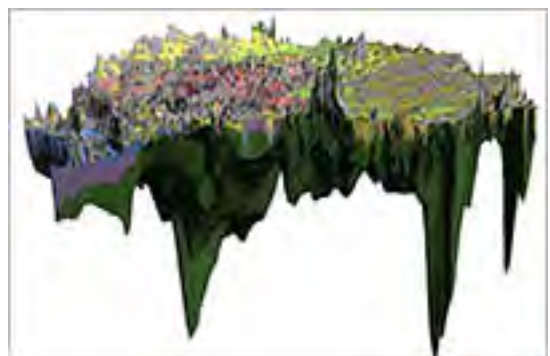
Water security in urban areas has been improved through investment in desalination plants. Coastal urban regions can produce desalinated water to meet a portion of urban demand. In 2013–14, Adelaide and Perth relied on desalinated water for almost 40% of urban supply, an increase of more than 30% from 2012–13. In comparison, good surface water availability in Melbourne, South East Queensland and Sydney meant little or no desalinated water was produced in these regions.

To celebrate National Water Week in 2014, the Bureau of Meteorology [released the Australian Groundwater Explorer](#) at Australian Parliament House.

Parliamentary Secretary to the Minister for the Environment, Simon Birmingham, launched the valuable tool which provides a comprehensive picture of Australia's groundwater resources.

National Water Week is a great time to increase community awareness around water issues and how best to use our valuable water resources.

The Australian Government's Improving Water Information Programme, led by the Bureau and supported by water agencies across the country, is helping to improve our national understanding of all water resources, including groundwater.



Water data at your fingertips

Water Data Online provides a single access point to nationally consistent, timely data from thousands of water monitoring stations across Australia.

As a water manager, policymaker, researcher or industry professional, you can better understand Australia's water resources by viewing or downloading data and reports. You can now find standardised watercourse level and watercourse discharge data from approximately 3500 water monitoring stations around Australia.

Water Data Online displays information collected by the Bureau of Meteorology from lead State and Territory water agencies under the Water Regulations 2008. Over time, more stations and parameters will become available and linkages will be made from the Geofabric.



1.2.6 WIRADA

Water Information Research and Development Alliance (Source for information below: <http://www.bom.gov.au/water/about/waterResearch/wirada.shtml>)

The Water Information Research and Development Alliance (WIRADA) is a partnership between the Bureau of Meteorology and The Commonwealth Scientific and Industrial Research Organisation. WIRADA brings together CSIRO's leading expertise in water and information sciences and the Bureau's operational role in hydrological analysis and prediction to deliver value-added water information products and tools.

The initial \$50 million investment during 2008 to 2013 delivered significant scientific and research innovation required by the Bureau to fulfill its national water information mandate. A snapshot of the [outstanding achievements made by WIRADA previously](#) is available for download. Details on the achievements of WIRADA are also in annual reports under the Key Documents list below. The Water Information Research and Development Alliance (WIRADA) 2014–15 annual report details the outcomes of a \$5 million dollar investment by the Bureau of Meteorology and CSIRO. The Alliance delivered 11 journal papers, 27 conference papers and 21 technical reports in 2014–15, for research in water informatics, water resource assessment modelling and streamflow forecasting.

Highlights and achievements include:

- A final standard (WaterML2.0 Part 2) for adoption by the Open Geospatial Consortium to describe, share, and access rating tables, stream gaugings and cross-sections.
- Work towards new standards for the exchange of groundwater features (aquifers, boreholes, wells, construction components, etc.) and observations.
- A new version (v5.0) of the Australian Water Resources Assessments (AWRA) modelling system that successfully couples landscape and river modelling components. The model incorporates improvements to the landscape modelling component, and an extended river model for catchment headwaters. The Bureau is currently implementing the models operationally into a unified system based on the Python language.
- A new staged error-modelling approach that corrects long-term biases, updates model forecasts using recent prediction errors, and describes the distribution of residual errors. The Bureau is adopting this error-modelling approach as it transitions the new 7-day streamflow forecasts service to produce ensemble forecasts.
- An improved and simplified Forecast Guided Stochastic Scenarios (FoGSS) model for seasonal streamflow predictions, which now requires fewer parameters. Its performance has been successfully evaluated in 63 catchments including a number of intermittent systems. Computer code for the model is now with the Bureau for operational deployment.

1.2.7 Australian Rainfall and Runoff

Climate Change Guidelines

ARR launched its Interim Climate Change Guidelines at the Engineers Australia Convention 2014 in Melbourne in November. These guidelines were led by Dr Bryson Bates from CSIRO. This draft discussion paper draws on the most recent climate science, particularly the release of the IPCC Fifth Assessment Report on the Physical Science Basis in September 2013 (IPCC, 2013) as well as the new climate change projections for Australia (CSIRO and BoM, 2014), and outlines an approach to address the risks from climate change in projects and decisions that involve estimation of design flood characteristics. For consistency with the revised IFD design estimates for Australia, the Interim Guideline is intended to be applied to current-day rainfall intensities with a probability of one exceedance per year or annual exceedance probabilities (AEPs) from 50% to 1%.

1.3 Educational and training courses

The National Centre for Groundwater Research and Training (a joint venture between 9 research/educational institutions, government water management organizations and private consultants) organises a wide range of groundwater related training courses. Details of courses can be found at the web site <http://www.groundwater.com.au/conf/content.asp>. The centre has established strong links with institutions in the region, particularly in Indonesia, Malaysia, Thailand and China.

1.4 Publications

There are numerous Publications from various conferences and Journals. Some of Particular interest are :

Recent publications of National Water Commission

<http://www.nwc.gov.au/publications>

[Australia's water blueprint: national reform assessment 2014](#)

20 Oct 2014

[Urban water futures 2014](#)

14 Oct 2014

Over the past 10 years, the Australian urban water sector has weathered new extremes in drought and flood and, as a result, has changed significantly.

[Annual report 2013-14](#)

07 Oct 2014

This is the National Water Commission's report to parliament on our performance in 2013–14. It reports on our performance against our outcome, deliverables and key performance indicators as outlined in our Portfolio Budget Statement.

1.5 Participation in international scientific meetings

There have been numerous individuals participating in many meetings for IHP, APFRIEND, WMO, SOPAC, HELP.

The Groundwater Governance '[Shared Global Vision for 2030](#)', '[Global Framework for Action](#)' and '[Global Diagnostic](#)' involved participation from many Australian researchers at different consultation meetings and in the final expert panel meeting.

1.6 Other activities at a regional level

A project titled: Enhanced Application of Climate Predictions in Pacific Island Countries is currently in progress to meet the general goals of improving weather and climate services and products. The AusAID funded project is developing a climate prediction capacity in participating countries, and in particular, is providing a framework for incorporating climate prediction information into planning across a broad range of agencies and industries. The climate prediction system being provided under the project is based upon the seasonal climate prediction system of the Australian Bureau of Meteorology, which has successfully issued climate predictions for some years. (www.bom.gov.au/climate/pi-cpp/)

Dr Peter Dillon of the CSIRO, Water Recycling and Diversified Supplies, Urban Water Theme, Water for a Healthy Country Flagship Program, CSIRO Land and Water, has been active in Managed Aquifer Recharge across the region and beyond.
www.clw.csiro.au/research/urban/reuse

1.6.1 Institutional relations/co-operation

No information available at this time.

1.6.2 Completed and ongoing scientific projects

Refer section 1.2.3 re ongoing Pacific Island projects.

2. Future Activities

2.1 Conference Activities in 2016/17

- The 37th Australian Hydrology and Water Resources and the 56th New Zealand Hydrological Society Symposium will be held on 28 Nov to 2 Dec 2016 in Queenstown, New Zealand.
- Floodplain Management Australia, 2017 Conference , 16-19 May 2017, Newcastle, NSW, <http://www.floods.org.au/site/newcastle>
- Australasian Groundwater Conference, Groundwater Futures, Science to Practice, Sydney, 11-13 July 2017, <http://www.groundwater.com.au/pages/australian-groundwater-conference-2015>
- Ozwater'17, 16-18 May 2017, Sydney, <http://www.ozwater.org/>

2.2 Activities Planned for 2015/16

- Transference of the outcomes of update of ARR to the International Community.
- Continuation of assistance to Pacific Island Projects.
- Continuation of involvement in Asian Pacific FRIEND and Global FRIEND
- Continuation of involvement in HELP
- Participation in the IHP Intergovernmental Council of 2014/2016

2.3 Activities envisaged in the long term

No information available at this time.

CHINA

National Report on IHP Related Activities

for

24rd UNESCO IHP Regional Steering Committee (RSC) Meeting
for Southeast Asia and the Pacific (SEAP)

Contribution to IHP-VIII (2014-2021)

24-26 October 2016

Ulan Bator , Mongolia

Chinese National Committee for the IHP

1. ACTIVITIES UNDERTAKEN IN THE PERIOD OF OCT 2015 – SEPT 2016

1.1 Meetings of the Chinese National Committee for IHP

1.1.1 Decision regarding the composition of the Chinese National Committee

The current IHP national committee consists of 29 distinguished water experts who are active in hydrology and water resources work in China. Where, Mr.Cai Jianyuan is appointed as the new Chairman of the China National Committee for IHP, following with the retirement of the formal Chair Mr.Deng Jian in early October 2016. There was no other particularly decisions been made during the past one year.

1.1.2 Status of IHP-VIII activities

Since 2016, IHP has been moved to its VIII-phase with focus of water security. Correspondingly, IHP China national committee has arranged projects and activities in all themes and almost all focal points of IHP-VIII through national committee members and working groups around the country. Several activities are provided in the following paragraphs.

1.2 Activities at national level in the framework of the IHP

1.2.1 National/local scientific and technical meetings

(1) Annual Hydrological Working Conference, April 8, 2016, in Jiaozhou, China



Organized by the Bureau of Hydrology, MWR, the annual working Conference was held to review the work of 2015 and the “Twelfth Five-Year Plan”, and to make arrangement of 2016 work plan and the "Thirteenth Five-year Plan" for the hydrological work. The Bureau of Hydrology of MWR, Bureau of Hydrology at all levels of China including provincial level and river basin level, as well as HoHai University took part in the meeting.

Vice minister of water resources, Mr.Liu Ning, made a summary of the work in the past “Twelfth Five-Year Plan”, announced the overall objective of the hydrology development for the "Thirteenth Five-Year Plan", and promoted the development of National hydrological strategy, including the hydrological service management system to meet water conservancy requirements and national social economic development needs, construction of hydrological information service system to promote the ecological protection needs, and optimization of the hydrometric network to enhance the ability of hydrological monitoring and forecasting, in order to promote the overall hydrological services capacity, for a more efficient and sustainable social development.

(2) The 4rd forum of hydroinformatics and digital water of China, 24 March 2016, in Wuhan, China

Aiming to promote the implementation and development of hydroinformatics and digital water, the forum was jointly organized by the China International Water Ecological Security Committee Secretariat, Neijing Wote Consulting Co. Ltd, Journal of Heilongjiang Hydraulic Engineering etc. Within the theme of “System construction of hydroinformatics at Internet+ Age”, the forum provided a platform for exchange and communication on Integration and sharing information of urban flood control and environmental friendly city development, flood control and drought relief, Soil moisture and groundwater monitoring, rational allocation and efficient utilization of agricultural water resources, as well as intelligent water conservancy census, Information resources development and utilization through Internet Cloud Computing and big data..



(3) International Association of Hydrological Sciences, China National Committee Academic Conference , September 23, 2016, in Nanjing, China

On September 23, 2016, the International Association of Hydrological Sciences, China National Committee (CNC-IAHS) academic conference was held in Nanjing, China. Content of the conference based on IAHS focused on the water system tracing and dating, the changing environment of hydrology and water resources forecasting, hydrological science and environmental change in social system and its interaction, urban hydrological uncertainty analysis and academic exchanges. The general assembly of IAHS arranged more than 100 times academic reports in total, providing an active platform for the communication and exchange, to promote the integration of domestic hydrological science. More than 200 experts and scholars attended the meeting.

(4) Establishment of the China Water Resources Strategic Research Association and the 3rd conference of the Global Water Partnership Chinese committee, March 22, 2016, Beijing, China

Minister of water resources Mr.Chen Lei attended the opening ceremony of the general assembly of the 3rd conference of the Global Water Partnership Chinese committee and delivered a speech. He stressed that the Chinese Committee of the global water partnership has carried out a lot of fruitful work since its inception in 2000, on research activities, idea spreading between partners, and deepening and expanding international exchanges of water. He pointed out that the Chinese water resources strategy research association needs to accurately grasp the major decisions and arrangements of the Central Committee and the new policy on water conservancy, the association should play a "think tank" and "Thought library" role, and write a new chapter in the research of water resources strategy China, to provide support to accelerate the reform and development of water resources for a well-off society.



On behalf of the global water partner headquarters, Ms.Angela Clausen, senior network official for Global water partner, delivered a speech. She expressed his appreciation for China's achievements in the comprehensive management of water resources. She pointed out that Chinese is with their great determination and wisdom to solve water problems, such as the implementation of the stringent water management system, carrying out river protection and ecological restoration, strengthening flood and drought management, properly dealing with water, energy and food ties, and actively promoting the environmental friendly urban development. These are the effective way to deal with the challenges of water. She believes that China's Water Resources Strategy Research Association and the global water partnership China Committee will open a new chapter in the development and play a more important role to promote the comprehensive management of water resources and promote sustainable development.

The General Assembly adopted the "China Water Resources Strategy Research Association", and elected the first China Water Resources Strategic Research Council. The national water security strategy research forum was hold thereafter.

(5) The 2015 annual academic meeting of the China Water Conservancy Society, October 26th 2016, in Nanjing, China

The three days annual meeting on water safety and water technology was launched on 26th October in Nanjing China. Chairman of the China Water Conservancy Association Mr.Hu Siyi

presided over the opening ceremony. Mr. Xu Ming, vice governor of the Jiangsu Province and Xu Mr. Hui Ho Hai, president of the Ho Hai University delivered speech. Vice minister of water resources Mr. Zhou Xuewen made a presentation entitled "13th Five-Year planning" on the development of water conservancy reform. The conference was held in 5 sub-venues (including an international venue) respectively. Topics of drinking water safety, interbasin water diversion project operation, groundwater, and dredging and sludge treatment were intensively discussed. More than 600 people including representatives of the members of the scientific research personnel, as well as participants from Canada, Australia, the United Kingdom, Korea, Japan and other foreign Associations attended the meeting.

(6) South-South cooperation water management experience exchange meeting, June 22, 2016, in Beijing, China

The Ministry of water resources of China and the Asian Development Bank (ADB) jointly held the water management experience exchange meeting for South-South cooperation in Beijing. Participants from 10 member countries of Mongolia, Pakistan, Tajikistan, Uzbekistan, Bangladesh, Nepal, Kampuchea, Indonesia, Thailand, Vietnam were invited to the meeting. The meeting focused on the issues of water conservancy and technology achievements, water policy and water management system, flood control and drought mitigation, water ecological planning and environmental protection and restoration, and application of series of Chinese technical standards. In-depth discussion, idea exchange and experience in related field from participants were made throughout the meeting.

(7) China Japan South Korea water management policy innovation youth expert seminar, 3 June 2015, Beijing, China

The seminar themes the implementation of the 2030 water development agenda to promote sustainable use of water resources. More than 40 water conservancy experts from research institutions and related enterprises from China, Japan, South Korea and water authorities participated the meeting. During the meeting, Young experts from Japan, South Korea and China had warm discussion around three themes "water conservancy and efficiency management policy", "coping with frequent extreme weather under the flood control and drought relief work", "the era of big data smart water conservancy technology development and application". 13 keynote speeches were delivered on different sessions, and main problems facing in the water were promoted. Examples of the application of innovated technology on agricultural water, recycled water, groundwater management and monitoring management system in Japan and South Korea were presented. Discussions were made on the common concerns of the impact of climate change on water resources. The Conference laid a good foundation for the young people from three countries further deepening trilateral cooperation in water conservancy.



(8) National Symposium on Application of new technologies for hydrological monitoring, 25 November 2015, in Nanjing, China

The National Symposium on new technologies applied in hydrological monitoring was jointly organized by the China National Committee of the Ministry of Water Resources and the international hydrological program (IHP). Mr. Ni Weixin, deputy director of Bureau of Hydrology of Ministry of Water Resources and other 5 experts were invited to the conference. 36 authors and experts presented special reports on new technologies and new products for hydrological monitoring. This meeting was aimed to provide multi vendor communication platform in the field of hydrological monitoring for research institutes and professionals. It is targeted to promote the application of new technology and new equipment and new products on hydrological monitoring.

(9) Symposium on variation of hydrological processes and water resources regulation, June 18-19, 2016, Nanjing, China

This seminar is jointly organized by Nanjing Hydraulic Research Institute and the University of Illinois, Urbana-Champaign. More than 80 experts from Tsinghua University, Wuhan University, South China University of science and technology, Chinese academy, Chinese IWHR as well as others attended the seminar.

During the seminar, 7 experts including Professor Cai Ximing of University of Illinois, Urbana-Champaign, professor Liu Guowei of Nanjing Hydraulic Research Institute presented their work. Topics of the seminar includes the hydrology and water resources research, hydrosphere evolution, runoff formation, eco-hydrological coupling and so on. Scientists shared their experiences and research achievements, which made a seminar a wonderful success.

(10) The 3rd meeting of the Third Academic Committee of the State Key Laboratory of hydrology, water resources and hydraulic engineering, 12 December 2015, Nanjing, China



The 3rd meeting of the Third Academic Committee of the State Key Laboratory of hydrology, water resources and hydraulic engineering was held in Nanjing on 12th December 2015. More than 10 high level academicians and experts led by director of the academic committee Mr.Wang Hao, attended the meeting. Mr.Xu Hui, President of Hohai University and Dr.Zhang Jianyun, president of the Nanjing Hydraulic Research Institute, delivered the keynote speeches.

Consensus for the laboratory were achieved through the meeting that, a leading role in the science and industry must be played by the key laboratory, integrated research direction on the key technology of National key research projects should be collaboratively innovated, the field base and experiment platform should be strengthened, and the training and in-depth international cooperation should be strengthened to enhance the international influence of the laboratory.

(11) The 3rd Sino-American Forum on energy, water resources, climate and air pollution Sustainable Development, January 21~22,2016, Beijing, China

The Forum was hosted by Peking University. National Natural Science Foundation of China, National Science Foundation of the United States, and Beijing Science and Engineering new Technology Innovation Center co-hosted the Forum. The conference aims to promote the academic exchanges in the fields of energy, water, environment and others between China and the United States, and to explore the cooperative research projects as well as to identify the key issues of the researches. Topics of the Forum include the urbanization and the challenges in energy, climate, water resources and air quality, affect on oil and gas development for water and air; combustion effect on air quality and climate change; and sustainable development of water resources and management.

1.2.2 Participation IHP Steering Committees/Working Groups

(1) The 22nd session of the Intergovernmental Council of the United Nations Educational, scientific and Cultural Organization (UNESCO) International Hydrological Programme (IHP), 12 to 17 June 2016, Paris, France

The 22nd session of the Intergovernmental Council of UNESCO-IHP was held in Paris On June 12th - 17th, 2015. Chinese delegation with 11 representatives led by Mr. Ni Weixin, deputy director of the Bureau of hydrology of Ministry of Water Resources, attended the session. During

the session, the delegation participated in the 12th Kovacs Release jointly organized by IAHS and UNESCO IHP. The delegation also attended the side meetings, such as the forum of international flood 2016-2022 strategic planning, hydro-ecological forum, urban water and climate change adaptation strategic, (International Initiative on Water Quality (IIWQ)), responding to the challenges of Sustainable Development Goals (SDGs), etc. Achievements were gained through the in-depth communication and discussion with the UNESCO-IHP Secretariats and representatives from various countries. The delegation also had a brief meeting with water quality data center of the German Bureau of hydrology on 16th, June.



The Council was kicked off in the morning of June 13th and wrapped up in the afternoon of June 17th, 2016. Chairman of the board of directors of the new term (2016 ~ 2018) and the 4 vice presidents were elected during the meeting. Various activities related reports, including those from Mr. David Korenfeld Federman, the outgoing Chairman, and the director-general of the UNESCO, were delivered. The Council approved the agenda of the meeting and the Council's working plan, discussed the report on UNESCO's mechanism changes, Extra budgetary activities related to the international hydrological programme, report of the finance committee of the international hydrological programme, 50 years anniversary of the International Hydrological Programme and the implementation plan, and UNESCO-IHP water in family plan etc. A number of resolutions were approved through the Council.

1.2.3 Research/applied projects supported or sponsored

The website of the Chinese National Committee for IHP has been supported by UNESCO Beijing office. It is updated regularly for distributing information to the public. Announcement of web-based training courses, international conferences as well as information of research projects, are shared with professionals national-wide on the website. Details can be found through the official web: <http://www.chinaihp.org>.

1.2.4 Collaboration with other national and international organization and/or programs

(1) China and Netherlands signed the memorandum of understanding on cooperation in the field of water resources, September. 2016

On September 26th, Mr.Chen Lei, Chinese water resources minister and Ms.Schultz van Hagen, Holland infrastructure and environment minister, attended the Sino-Dutch water management seminar to renew the memorandum of understanding on cooperation in the field of water resources, and both delivered speeches,. André Driessen from the Embassy of the Kingdom of the Netherlands in China attended the ceremony. Before the seminar, Mr.Chen Lei held talks with Ms.Schulz Varnhagen. The two sides reviewed the achievements gained throughout Sino-Dutch water cooperation, and exchanged the view of strengthening cooperation in the field of water resources. During the seminar, a total of 14 Dutch government officials and water experts presented their ideas on water policy, flood risk management, environmental friendly urban construction, protection of water resources and water ecological restoration and other issues. Nearly 120 delegates from Chinese local water conservancy department, river basin agencies, research institutes and enterprises attended the seminar.



(3) The Sino-French third phase cooperation on Water Resources Integrated Management of the Haihe River Basin, March 1, 2016, Tianjing, China

In order to further deepening and promoting the bilateral pragmatic cooperation in the field of water resources development, the steering committee of China and France water cooperation held the third stage meeting of the integrated management of water resources in Haihe River Basin in Tianjin on March 1st. The two countries signed a cooperation agreement for the third stage of Sino-French comprehensive management of water resources in Haihe River Basin.

According to the agreement between the two sides, China and French will implement the third phase cooperation in watershed management from 2016 to 2018. The third stage cooperation will focus on technical development, including the field of regional groundwater protection and restoration, early warning and disposal of algae, persistent monitoring of organic pollutant, water environmental protection and ecological restoration as well as other project cooperation. At the same time, the two sides will further promote the capability to build up regular training mechanism and carry out trainings in both China and France. The work on “Chuanhe river basin planning”, "Technical guide of Sino French water resources management planning", "Implementation plan on water resources and ecological restoration for Zhouhe river basin (2016 - 2020)", will be carried out and further extended to the Luanhe River Basins. The two sides will also actively explore possibility of the establishment of a science experimental base for lake water

ecology and environment in northern China.

1.3 Education and training course

1.3.1 Organization of specific training courses

(1) Ministerial Seminar on water resources management and development planning for the developing countries 2015, October 19-25, 2015, Hangzhou, China

The Ministry of Commerce and the Ministry of water resources of China jointly hosted the ministerial seminar on water resources management and development planning for developing countries in Hangzhou in October 19th - 25th, 2015. The Nanjing Hydraulic Research Institute undertook the Seminar. Mr. Jiao Yong, vice Minister of water resources, attended the opening ceremony and delivered the keynote speech "new opportunities, mutual benefit and win-win cooperation and development". The speech focused on the aspects of basic water situation, China water conservancy development and management achievements, and future water conservancy reforms in China, and answered questions on river sedimentation and water conservancy project operation mechanism, flood control and warning technology, and so on. Dr. Zhang Jianyun, academician of the Chinese Academy of Engineering, president of the Nanjing Hydraulic Research Institute, presided over the opening ceremony. 21 senior officials and Ministers responsible for water resources management and development from 9 countries of Afghanistan, Ecuador, Ethiopia, Egypt, Ghana, Panama, Malawi, Uganda, Zimbabwe participated in the week-long seminar.

(2) 2015 international training course on geological disaster prevention and control technology, November 2015, Wuhan, China

The Yangtze River committee held the "2015 international training course of geological disaster prevention and control technology" in Wuhan. The training course was hosted by the Ministry of water resources of China. 7 experts were invited to carry out a 10 days training lectures on geological disaster prevention and control technology. Participants from 5 countries of the Mekong River basin and Nepal attended the training. Visit to Three Gorges project, Hunan Chaling County flash flood monitoring and warning system, Liuyang flash flood and disaster prevention platform, were arranged during the training.

Members from the Burma disaster relief and immigration department, the Laos Ministry of natural resources and environment, the Thailand Ministry of natural resources and environment, the Kampuchea water conservancy and meteorological department, the Vietnam National Mekong River Commission and the Nepal forestry and soil and water conservation department, participated in the training. Mr. Ma Jianhua, chief engineer, deputy director of the Yangtze River committee, attended the graduation ceremony and issued certificates of completion of the training course for the participants.



(3) International Training for climate change adaptation and water resources management, October 16, 2015, Beijing, China



International training for climate change adaptation and water resources management co-organized by the Yellow River Water Conservancy Commission and Tsinghua University Asia Pacific Water Safety Research Center was launched on October 16, 2015 in Beijing. Officials from water conservancy, environmental resources and other government departments of 11 countries in Southeast Asia attended the Training. Mr. Sun Fu, Coordinator of the Asia Pacific Water Security Research Center, introduced the Chinese experience on urban water resources comprehensive management, and demonstrated its implication in Beijing city as an example. Members of the training group had a warm discussion based on the Chinese experience and their own. During the event, the training group also visited the environmental friendly energy-saving building and college public research platform, and part of the laboratory built through the cooperation between China and Italy.

(4) Training seminar on design and construction of automatic hydrological data acquisition and forecasting system for developing countries, April 19th, 2016, Changsha, China

Sponsored by the Ministry of Commerce, Chinese Zhongnan Engineering Corporation Limited hosted “the 2016 training seminar on “design and construction of automatic hydrological data acquisition and forecasting system for developing countries” in Changsha city in China on April 19th. Officials from 36 developing countries including Afghanistan, Laos and Albania attended the seminar.

The seminar aims at promoting friendly exchanges between China and other developing countries, expanding economic and technological cooperation in the field of hydrological forecast and water resources management to better protect the environment and promote the harmony between human and nature for sustainable development. Chinese hydrologists introduced the development of water resources utilization, design and construction of the automatic hydrological data acquisition and forecasting system and its application, and in-situ flow monitoring technology in China. Participants carried out discussions and exchanged the ideas on the hydrological development and technology. During the seminar, two separate site visits to Changsha hydrological station and Hainan Daguangba Hydropower Project were well organized. Participants had a deep impression and comprehensive understanding of the current situation and development prospects of China's water conservancy. The seminar also provided an opportunity to exchange and learn experiences from each other.

1.3.2 Participation in IHP courses

No observation of how many have actually participated in (or have received) the distance learning via web-courses. But the web-based distance learning notices received from UNESCO Jakarta office have been widely distributed through IHP China website and emails from IHP China secretariat.

1.4 Participation in meetings abroad

(1) Participate in the Stockholm International Water Week, August 30, 2016, Sweden

On August 30th, during the Stockholm international water week, the Asia Pacific Center for water safety research of Tsinghua University, the Asian Development Bank (ADB), the International Water Management Institute (IWMI), University of Oxford, the World Wildlife Fund (WWF), co-sponsored the release conference of “2016 Asian Water Development Outlook” (AWDO).

Mr.Bambang Susantono, deputy governor of ADB, in charge of knowledge management and sustainable development, delivered a keynote speech at the conference. He introduced the main research results of the report. Mr.Ravi Narayanan, Chairman of the Asia Pacific Forum Management Committee, chaired the discussion.

AWDO is co-sponsored by the ADB and the Asia Pacific Water Forum and regularly published to the public. It is aimed to evaluate national and regional water security situation in the Asia Pacific region, to provide suggestions for policy decision-makers and investors. "2016 Asian Water Development Outlook" is the third edition of the series, where the first two editions were published in 2007 and 2013, respectively. The Asia Pacific Center for water safety research of Tsinghua University joined the work on AWDO report. Experts from the Asian Water Development Program, the Global Water Partnership, the International Institute for Applied

Systems Analysis and other institutions have also made important contribution to the report.

(2) Participate in the Singapore International Water Week activities, July 2016, Singapore

Invited by the Singapore Public Utilities Board & Singapore International Water Week Organizing Committee, the Ministry of Water Resources of China sent a delegation to Singapore to participate in the "seventh Singapore International Water Week" and carry out water resources project related activities from July 9th to 13th. The delegation was led by Ms.Chen Qin, deputy director of the Yangtze River Water Committee. A total number of 11 people from the Yellow River Water Resources Committee, the Pearl River Water Conservancy Commission, Songliao river water resources committee, as well as the Ministry of water resources development research center participated in the activities.

Together with the Chair of World Water Council, executive director of the association of Australia water service and other guests, Ms.Chen Qin attended the water summit during the activities and discussed the "role" in government administration and coordination of urban water resources adaptive planning. She also introduced the Chinese strict water resources management policy as well as the comprehensive water resources management experiences. Mr.Liu Hui, deputy director of the Yangtze river water environment monitoring center, contributed in by presenting the topic "building green ecological corridor, maintaining the healthy Yangtze River". The delegation also submitted 4 posters of "seasonal rivers and ecological protection and restoration technology", "Research on groundwater environment health warning method", "Application of chlorophyll a fluorescence of six kinds of toxic substances the toxicity assessment", "Outlook on seawater using in China" during the activities.

2 FUTURE ACTIVITIES

For IHP China, the National Committee will continue to actively promote the related work in comply with the framework of IHP, key activities planned to until December2016 will be as follows:

- (1) Reorganize the Chinese national committee for IHP with new members and replacement of several positions of the committee including the chairperson and secretariat etc.
- (2) Continue to pay high attention for the regional (and international) cooperation under IHP framework and to encourage cross-cutting cooperation with other international programmes.
- (3) Contribute to the implementation of IHP VIII strategic plan, particularly in the field of integrated river basin management, environmental and ecological sustainability of river basins. These activities also require strong convener-ship from UNESCO-IHP at global level or regional level.

Projects related to IHP-VIII themes will be continuously supported by the Ministry of Water Resources though IHP Chinese national Committee in next year. IHP China will try to focus on work of national planning on hydrometric network planning and development, hydrological monitoring technique renovation, flood forecasting system updating, and participate in integrated water resources management, national rural drinking water planning, multiple reservoir operation and optimization, particularly to promote the basin-wide integrated water resources management at national scale.

IHP China will continue to encourage scientific and technical symposia and workshops. Cooperation among the Southeast Asia and the Pacific will be top priority.

NATIONAL REPORT ON IHP RELATED ACTIVITIES

Japan

Various activities of UNESCO have been implemented under the support of the Japanese National Commission for UNESCO with financial contribution in the form of Fund-in-Trust (JFIT) for the Promotion of Science for the Sustainable Development. Japanese National Committee for IHP of UNESCO is expected to solve complex global challenges through following activities with a cross-cutting approach in collaboration with all the studies including social and human sciences, in addition to changing value. The following summary includes the activities of Japanese National Committee for IHP of UNESCO undertaken during April 2015 to October 2016.

1. ACTIVITIES UNDERTAKEN IN THE PERIOD APRIL 2015 – OCTOBER 2016

1.1 Composition of the IHP National Committee

The composition of the Japanese IHP National Committee is as follows:

Members of the IHP National Committee as of October 2016.

	Name	Position	E-mail
Chair*	TACHIKAWA Yasuto	Prof., Kyoto Univ.	tachikawa@hywr.kuciv.kyoto-u.ac.jp
*	UEMATSU Mitsuo	Director and Prof., CICAORI, The Univ. of Tokyo	uematsu@aori.u-tokyo.ac.jp
*	KURODA Reiko	Prof. The Tokyo Univ. of Science	rkuroda@rs.tus.ac.jp
	OKI Taikan	Prof., IIS, The Univ. of Tokyo	taikan@iis.u-tokyo.ac.jp
	KAZAMA Futaba	Prof., Univ. of Yamanashi	futaba@yamanashi.ac.jp
	KAWAMURA Akira	Prof., Tokyo Metropolitan Univ.	kawamura@tmu.ac.jp
	TANIGUCHI Makoto	Prof., RIHN	makoto@chikyu.ac.jp
	CHIKAMORI Hidetaka	Prof., Okayama Univ	tikamori@cc.okayama-u.ac.jp
	TSUJIMURA Maki	Prof., Univ. of Tsukuba	mktsuji@geoenv.tsukuba.ac.jp
	NAKAYAMA Mikiyasu	Prof., The Univ. of Tokyo	nakayama@k.u-tokyo.ac.jp
	HARUYAMA Shigeo	Prof., Mie Univ.	haruyama@bio.mie-u.ac.jp
	HIYAMA Tetsuya	Prof., ISEE, Nagoya Univ.	hiyama@nagoya-u.jp
	HORI Tomoharu	Prof., WRRRC, DPRI, Kyoto Univ.	hori.tomoharu.3w@kyoto-u.ac.jp
	MIYAKE Katsuhito	Deputy Director, ICHARM, PWRI	k-miyake@pwri.go.jp
	WATANABE Tsugihiko	Prof., Kyoto Univ.	nabe@kais.kyoto-u.ac.jp

Notes:

- * Member of the Japanese National Commission for UNESCO;
- CICAORI: Center for International Collaboration, Atmosphere and Ocean Research Institute;
- DPRI: Disaster Prevention Research Institute, Kyoto University;
- ICHARM: The International Centre for Water Hazard and Risk Management (UNESCO Category II Centre);
- IIS: Institute for Industrial Sciences, University of Tokyo;
- ISEE: Institute for Space-Earth Environmental Research, Nagoya University (formerly Hydrospheric Atmospheric Research Center (HyARC));
- PWRI: Public Works Research Institute;
- RIHN: Research Institute for Humanity and Nature; and
- WRRRC: Water Resources Research Center.

Secretariat of the Japanese National Committee for IHP, UNESCO:

c/o Ms. MOTOOKA Yoshiko

Japanese National Commission for UNESCO,

Ministry of Education, Culture, Sports, Science and Technology (MEXT)

3-2-2 Kasumigaseki, Chiyoda-ku, Tokyo 100-8959, Japan

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TEL: +81-(0)3-6734-2585 / FAX: +81-(0)3-6734-3679, <http://hywr.kuciv.kyoto-u.ac.jp/ihp/japan/>

1.2 Status of IHP-VIII activities

Various activities relating to IHP-VIII (2014-2018) Themes have been implemented since 2014. As a research and education activity related to all themes in IHP-VIII, development of Catalogue of Hydrologic Analysis (CHA) has been launched in 2016 with the support of Japan-ASEAN Science and Technology Innovation Platform (JASTIP).

THEME 1: Water Related Disasters and Hydrological Changes

FA 1.1 – Risk management as adaptation to global changes

- Climate change research under the MEXT SOSEI program “Program for Risk Information on Climate Change” is intensively conducted from 2012 to 2016
- Development of a new flood management method utilizing paddies into river management against global warming [National Institute for Rural Engineering (NIRE), Univ. of Tsukuba, The Univ. of Tokyo]

FA 1.2 – Understanding coupled human and natural processes

- Hydrogeological and sociological survey on development processes of East-Asian cities co-existing with floods [Kyoto Univ.]

FA 1.3 – Benefiting from global and local earth observation System

- Scientific sessions on interaction between hydrological cycle and physical/biochemical oceanography by cooperation between IHP and IOC held at annual meetings of JpGU in Pacifico Yokohama, Kanagawa, Japan, 28 April - 2 May 2014 and Makuhari Messe, Chiba, Japan, 24-28 May 2015 [JAMSTEC, The Univ. of Tokyo, Kyoto Univ.]
- UNESCO Pakistan project “Strategic Strengthening of Flood Warning and Management Capacity of Pakistan” [Phase 2: from 2015 to 2017] [ICHARM]
- Global water cycle assessment: IHP contribution to GEOSS [Univ. of Tokyo] collaborated with ICHARM. There are number of activities led by Prof. Koike (Univ. of Tokyo, Director of ICHARM) and others such as Asian Water Cycle Initiative and ICHARM symposium titled Asian Water Cycle Symposium (AWCS2016), Tokyo, Japan, 1-2 March 2016 [ICHARM, Univ. of Tokyo]

FA 1.4 – Addressing uncertainty and improving its communication

- Climate change research under the MEXT SOSEI program “Program for Risk Information on Climate Change” is intensively conducted from 2012 to 2016

FA 1.5 – Improve scientific basis for hydrology and water sciences for preparation and response to extreme hydrological events

- Collaborative joint research for hydrologic prediction between Yangon Technological University and Kyoto University since 2014. [Kyoto Univ.]
- Inundation analysis and Flood/drought risk assessment [ICHARM, PWRI, IFNet, JMA and universities] under the MEXT SOSEI Program from 2012 to 2016, changes of water-related disasters and water resources under global warming were investigated.
- Committee on Hydrosience and Hydraulic Engineering, JSCE, launched the subcommittee on flood risk management in 2013, which is in charge of field survey of actual flood cases (the subcommittee is chaired by Hori). The subcommittee conducted the field survey in five large flood and geo-hazard events which occurred in 2015 and 2016.
- Research Project on Disaster Prevention/Mitigation Measures against Floods and Storm Surges in Bangladesh [Prof. Nakagawa, DPRI, Kyoto Univ.] under the Science and Technology Research Partnership for Sustainable Development (SATREPS) from 2013 to 2018.
- Research to develop methodologies to observe, predict and analyze water-related hazards, supporting assessment of water-related risks [ICHARM/PWRI] from 2014 to 2016.
- Research to pioneer new methods and models to assess, analyze and monitor exposure and vulnerability to water-related hazards, supporting risk management at both local and global scales [ICHARM/PWRI] from 2014 to 2016.
- Japan-ASEAN Science and Technology Innovation Platform (JASTIP) supported by Japan Science and Technology Agency (JST) from 2015-2019 [Takara, Sayama, Tachikawa, Kyoto Univ.]

THEME 2: Groundwater in a Changing Environment

FA 2.1 – Enhancing sustainable groundwater resource management

- GWES (Groundwater in Emergency Situations).
Great Eastern Japan Earthquake and Tsunami showed the importance of groundwater use in emergency situation during disasters.
- UNESCO Chair on Sustainable Groundwater Management in Mongolia at the Institute of Geography and Geo-ecology, Mongolian Academy of Sciences and the University of Tsukuba, Japan. UNESCO has decided to launch Phase 3 activity (for next 4 years) of this chair between Mongolian Academy of Sciences and the University of Tsukuba in August 2015. The new phase of the chair will focus on the monitoring of the groundwater and the surface water interaction and the consultant on the sustainable groundwater resources governance in Ulaanbaatar, capital city of Mongolia.
- Frontier of sustainable groundwater management systems based on groundwater flow process in arid/semi-arid region in cooperation with China and Mongolia [Univ. of Tsukuba, Hiroshima Univ., Kumamoto Univ.]
- A research project on the impact of the forest thinning on the groundwater recharge funded by CREST Program of the Japan Science and Technology Agency (JST). [Univ. Tsukuba, Kyoto Univ., Univ. Tokyo, Kyushu Univ.]

FA 2.2 – Addressing strategies for management of aquifers recharge

- UNESCO Chair on Sustainable Groundwater Management in Mongolia at the Institute of Geo-ecology, Mongolian Academy of Sciences and the University of Tsukuba, Japan. The chair activity has been continued actively focusing on the monitoring of the groundwater and the surface water interaction and the consultant on the sustainable groundwater resources governance in Ulaanbaatar, capital city of Mongolia.

FA 2.3 – Adapting to the impacts of climate change on aquifer systems

- Groundwater resources assessment under the pressure of humanity and climate change (GRAPHIC) [Research Institute for Humanity and Nature (RIHN)]
UNESCO-GRAPHIC organized several international activities including symposiums and training courses to evaluate the effects of climate change and human activities on groundwater resources.

FA 2.4 – Promoting groundwater quality protection

UNESCO-IHP International Initiative on Water Quality (IIWQ) organized UNESCO International Scientific Symposium “Scientific, Technological and Policy Innovations for Improved Water Quality Monitoring in the Post-2015 SDGs Framework under the collaboration with Kyoto University and Lake Biwa Environmental Research Institute, 15th – 18th July, 2015 in Kyoto.

THEME 3: Addressing Water Scarcity and Quality

FA 3.1 – Improving governance, planning, management, allocation and efficient use of water resources

- DPRI initiated the Japan Egypt-Hydro Network (JF-HydroNet) with the coordination with three Egyptian Institutions under the umbrella of GCOE-ARS project at Kyoto Univ. for a joint research and education project on the water resources and environmental problems of the Nile Delta of Egypt [Prof. T. Sumi, WRRC, DPRI, Kyoto Univ.].
- Hydro-microbiological Approach for Water Security in Kathmandu Valley, Nepal [Prof. Kazama, Univ. of Yamanashi] under the Science and Technology Research Partnership for Sustainable Development (SATREPS) from 2013-2018.
- Asian G-WADI (Global Network on Water and Development Information for Arid Lands) and International Draught Initiative (IDI) held 6th Asian G-WADI and 1st IDI Expert Group Meeting, 13th – 16th June 2015, Tehran, Iran. [Prof. Tsujimura, Univ. Tsukuba, Prof. Koike, ICHARM]

THEME 4: Water and Human Settlements of the Future

FA 4.2 – System wide changes for integrated management approaches

- Development of a Comprehensive Disaster Resilience System and Collaboration Platform in Myanmar [Prof. Meguro, IIS, The Univ. of Tokyo] under the Science and Technology Research Partnership for Sustainable Development (SATREPS) from 2014 to 2019.
- Research to propose policy tools for integrated and comprehensive water and risk management to enhance human and ecosystem resilience, for instance through preparedness, early warning, and hard-soft integration [ICHARM/PWRI] from 2014 to 2016.

THEME 5: Ecohydrology, Engineering Harmony for a Sustainable World

FA 5.1 – Hydrological dimension of a catchment - identification of potential threats and opportunities for a sustainable development

- Hydrological and ecological impact assessment of long-term global warming on river basins in the world [Kyoto Univ.]

FA 5.2 – Shaping of the catchment ecological structure for ecosystem potential enhancement - biological productivity and biodiversity

- Valorization of Bio-resources in Semi- arid and Arid Land for Regional Development [Univ. Tsukuba]
Univ. Tsukuba has performed an international collaboration research on the relationship between the bio-resources and surface water/ groundwater resources in semi-arid regions in Tunisia funded by the Science and Technology Research Partnership for Sustainable Development (SATREPS) of the Japan International Cooperation Agency (JICA) and the Japan Science and Technology Agency (JST).

FA 5.3 – Ecohydrology system solution and ecological engineering for the enhancement of water and ecosystem resilience and ecosystem services

THEME 6: Water Education, Key for Water Security

FA 6.2 –Addressing vocational education and training of water technicians

- To share the knowledge of hydrologic modeling techniques and enhance the understanding of hydrologic predictions, CommonMP (Common Modeling Platform for water-material circulation analysis) was developed at the National Institute for Land and Infrastructure Management [NILIM].
- Promoted UNESCO's "IWRM Guidelines at river basin level (IWRM Guidelines)" by NARBO (Network of Asian River Basin Organizations)
- Preparation for Educational material of IWRM guidelines for UNESCO by Japan Water Agency, secretariat of NARBO.
- International Environment Leaders Training Program funded by Ministry of Education, Culture, Sports, Science and Technology (MEXT) [Univ. Tsukuba, Kyoto Univ., Univ. Tokyo, Kumamoto Univ. et al.]
- ICHARM Training Programmes and a one-year Master Degree Program on water-related risk management in cooperation with the National Graduate Institute for Policy Studies (GRIPS) supported by JICA.
- A series of training on RRI model and storm surge model for the government officers (DMH and ID) supported by the Asian Development Bank project "TA-8456: Transformation of Urban Management - Part II Flood Management" in the Republic of the Union of Myanmar [ICHARM]

FA 6.3 – Water education for children and youth

- Kyoto University is implementing a Leading Graduate Schools Program "Inter-Graduate School Program for Sustainable Development and Survival Societies" (2011-2018) [Takara, Hori, Tachikawa].
- Kyoto University implemented a collaborative education programs with universities in Asia "International Program on Resilient Society Development under Changing Climate" under Re-inventing Japan Project supported by MEXT (2016-2020) [Hori, Tachikawa]
- ICHARM Training Programmes and a one-year Master Degree Program on water-related risk management in cooperation with the National Graduate Institute for Policy Studies (GRIPS) supported by JICA.

- ICHARM Training Programmes and a three-year Doctoral degree program on “Disaster Management Program” cooperation with the National Graduate Institute for Policy Studies (GRIPS)
- Two short-term training courses have been conducted about Capacity Development for Flood Risk Management, June 2014-June 2016 [ICHARM].
- Joint international summer program “Sustainable Water Management in an Era of Big Data” co-organized with the University of Tokyo, July27-August 7, 2016 [ICHARM]
- University of Tsukuba has launched a new graduate level English course “SUSTEP (Sustainability Science, Technology and Policy) Program” to educate global leaders having comprehensive capacity of environment and sustainable development since April 2014.

Other regional and cross-cutting themes activities

(1) Post Catalogue of Rivers:

- As an activity for the post Catalogue of Rivers for Southeast Asia and the Pacific, development of Catalogue of Hydrologic Analysis (CHA) has been launched in 2016 with the support of JAPTIP. [Kobe Univ., Okayama Univ., and Kyoto Univ.] The information on CHA locates at <http://hywr.kuciv.kyoto-u.ac.jp/ihp/rsc/cha.html>

(2) Asian Pacific FRIEND:

- With the dissemination of information from the SEAP region it is hoped that there will be better understanding and co-operation on matters related to water resources within each country as well as regionally. Of particular importance was the establishment of the Asian Pacific FRIEND, a UNESCO-IHP regional collaborative project, and the Asian Pacific Water Archive (APWA) that archives and makes available hydrometeorological and related data for Asian Pacific FRIEND projects and other IHP related activities in the region. Japan has been contributing to Asian Pacific FRIEND since its first Technical Sub-Committee (TSC) meeting in Kuala Lumpur in May 1997.

(3) International Flood Initiative (IFI), International Sediment Initiative (ISI) and International Programme on Landslides (IPL):

- Contribution to IFI as secretariat
 ICHARM has been serving as the secretariat of the International Flood Initiative (IFI), a joint initiative with international organizations such as UNESCO (IHP), WMO, UN/ISDR, UNU, IAHS,AHR, ICLR and IIASA. ICHARM manages the IFI website (<http://www.ifi-home.info/>) and compiles inputs, materials and tools provided by member agencies, while also providing its own outputs. With respectful contributions from participatory organizations, IFI has been making an effort to conceptualize, design and implement flood mitigation and protective actions and activities. Being intimately aware of the achievements that have been made in flood management in the last decade, the IFI has also tried to foster the mobilization of resources and networks of the UN system, non-governmental organizations and so on in order to assist communities and governments in developing culturally sensitive flood management strategies and thereby addressing sustainable development, such as through IFI flagship project “to support benchmarking flood risk reduction at global, national and local levels” since 2013. ICHARM organized the IFI plenary session at the 6th International Conference on Flood Management (ICFM6), Sao Paulo, Brazil on 16 September 2014, the plenary session during the 23rd IHP RSC meeting in Medan, Indonesia on 21 October 2015, and the Flood Session towards IFI Asia Pacific region collaborated with the Asian Water Cycle Initiative (AWCI) and the Network of Asian River Basin Organizations (NARBO) also as the ICHARM’s ten-year anniversary on 1 March 2016 to discuss how to step forward and revitalize its activities aimed at the integrated flood management through monitoring, assessment and capacity building for the implementation of the important international frameworks such as the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) in March, Sustainable Development Goals (SDGs) in September and the Paris Agreement on Climate Change (Paris Agreement) all in 2015.

(4) UNESCO Chair on Sustainable Groundwater Management in Mongolia (Phase 3):

- Phase 3 has been launched in August 2015 (for next 4 years) between Mongolian Academy of Sciences and the University of Tsukuba. The new phase of the chair will focus on the monitoring of the groundwater and the surface water interaction and the consultant on the sustainable groundwater resources governance in Ulaanbaatar, capital city of Mongolia.

(5) International Commission on Tracers (ICT), International Association of Hydrological Sciences (IAHS)

- The ICT commission has established the session: “Tracer methods for understanding the response of hydrological systems to transient contamination” (Hw15) by 26th IUGG (International Union of Geodesy and Geophysics) General Assembly to be held in Prague, in June 2015 [Tsujimura, M., Univ. Tsukuba as a Vice President of ICT].
- The ICT commission has establish the workshop “Tracer and isotope hydrology” (S8.4) by 42nd IAH (International Association of Hydrogeologists) Congress, to be held in Rome, Italy in September 2015 [Tsujimura, M., Univ. Tsukuba as a Vice President of ICT].

1.3 Activities at national level in the framework of the IHP

1.3.1 National/local scientific and technical meetings

- IHP Training Course Task Forth Meetings in Nagoya and Kyoto and Working Group Meetings in Tokyo (Prof. Uyeda, Prof. Nakamura, Prof. Takara, Prof. Ishizaka and Prof. Sumi) were held several times in 2015 and 2016 to discuss the organization of the Training Courses, the plan for the 24th and 25th Training Courses, future direction, and the reviews.
- The 30th IHP National Committee meeting was held at MEXT on 30 May 2016 to discuss various issues relating to the 22nd Session of IHP Intergovernmental Council (June 2016) .

1.3.2 Participation in IHP Steering Committees/Working Groups

- The 23rd RSC meeting was held in Medan, Indonesia in conjunction with the International Symposium on "Integrated Actions for Global Water and Environmental Sustainability" in collaboration with North Sumatera University, 19-22 October 2015. [Takara, Chikamori, Tachikawa, Kobayashi, Takeuchi, Koike, Sayama]

1.3.3 Research/applied projects supported or sponsored

- Japan-ASEAN Science and Technology Innovation Platform(JASTIP) supported by Japan Science and Technology Agency (JST) [Prof. K. Takara, T. Sayama, Y. Tachikawa, Kyoto Univ.]
- “Precise Impact Assessments on Climate Change” supported by MEXT SOSEI Program “Climate Change Risk Information” 2012-2016 [ICHARM, PWRI, Kyoto Univ., Univ. Tokyo and others]
- JSPS-Asian Core Program, “Research and Education Center for the Risk Based Asian Oriented Integrated Watershed Management,” 2011-2015 [PI: Prof. Yoshihisa Shimizu, Kyoto Univ.]
- Program for Leading Graduate Schools “Inter-Graduate School Program for Sustainable Development and Survivable Societies” (GSS) 2011-2018 sponsored by MEXT-JSPS [Prof. Kaoru Takara, DPRI, Kyoto Univ.]
- Grant-in-Aid for ODA UNESCO activities, 2015 sponsored by MEXT [Kyoto University]
- Research Project "New frontiers in global hydrology" supported by Grant-in-Aid for Scientific Research of The Japan Society for the Promotion of Science. (2016-2022) [T. Oki, The Univ. of Tokyo]
- Research Project “Development of Landslide Risk Assessment Technology along Transport Arteries in Viet Nam” supported by the Science and Technology Research Partnership for Sustainable Development (SATREPS), 2011-2016, JST-JICA [K. Sassa, International Consortium on Landslides (ICL)]
- Research Project “A tracer simulator of fallout radionuclides for safe and sustainable water use” Core Research for Evolutional Science and Technology (CREST), 2011-2017, the Japan Science and Technology Agency (JST). [T. Oki, University of Tokyo]
- Research Project “Hydro-microbiological Approach for Water Security in Kathmandu Valley, Nepal” supported by the Science and Technology Research Partnership for Sustainable Development (SATREPS), 2013-2018, JST-JICA [F. Kazama, Univ. of Yamanashi]

- Research Project “Disaster Prevention/Mitigation Measures against Floods and Storm Surges in Bangladesh” supported by the Science and Technology Research Partnership for Sustainable Development (SATREPS), 2013-2018, JST-JICA [H. Nakagawa, DPRI, Kyoto Univ.]
- Research Project “Development of a Comprehensive Disaster Resilience System and Collaboration Platform in Myanmar” supported by the Science and Technology Research Partnership for Sustainable Development (SATREPS), 2014-2019, JST-JICA [K. Meguro, IIS, The Univ. of Tokyo]
- Research Project “Advancing of Co-Design of Integrated Strategies with Adaptation to Climate Change (ADAP-T)” supported by the Science and Technology Research Partnership for Sustainable Development (SATREPS), 2015-2020, JST-JICA [T. Oki, IIS, The Univ. of Tokyo]
- UNESCO Pakistan project “Strategic Strengthening of Flood Warning and Management Capacity of Pakistan” [Phase 2: from 2015 to 2017] [ICHARM]
- Asian Development Bank Project “TA-8456: Transformation of Urban Management - Part II Flood Management” in the Republic of the Union of Myanmar, July 2014-June 2016 [ICHARM]

1.3.4 Collaboration with other national and international organizations and/or programmes

The Japanese IHP National Committee has been closely collaborating with:

- Some committees in the Science Council of Japan (SCJ), including the Sub-Committee on IRDR (Integrated Research on Disaster Reduction) of ICSU (International Science Union), ISSC (International Social Science Council) and UNISDR (United Nations Office for Disaster Risk Reduction).
- The national government and its branches relating to hydrology and water resources administration,
- Nagoya University and Kyoto University for IHP Training Courses and Graduate School and other universities and research institutes,
- The Japan Water Forum (JWF),
- World Meteorological Organization (WMO), and
- International NGOs/NPOs such as the International Association of Hydrological Sciences (IAHS), the International Water Resources Association (IWRA), the International Association for Hydro-Environment Engineering and Research (IAHR), the World Water Council (WWC) especially for World Water Forum (WWF), the Asia Pacific Association of Hydrology and Water Resources (APHW), Asia Oceania Geosciences Society (AOGS) and the International Consortium on Landslides (ICL).

1.3.5 Other initiatives

ICHARM: International Centre for Water Hazard and Risk Management under the auspices of UNESCO was established in Tsukuba, Japan in March 2006, after getting accreditation by the member states of UNESCO at the 33rd General Conference of UNESCO. Dr. Kuniyoshi Takeuchi, the former chairman of the Japanese National Committee for UNESCO-IHP, was assigned as the first Director of ICHARM. In its inception, ICHARM has been playing core roles in research, training, and information networking activities on water-related disasters at global levels. The activities are expected to contribute in the prevention and reduction of water-related disasters, focusing on flood disasters at the initial stage. On 1 October 2014, Dr. Toshio Koike, Professor of the University of Tokyo, was assigned as the second Director of ICHARM while the former director assigned as the Advisor at ICHARM.

On 23 July 2013, the Ambassador of Japan to UNESCO, H.E. Mr Isao Kiso and the Director-General of UNESCO, Irina Bokova, signed an agreement for the renewal of ICHARM at the UNESCO Headquarters in Paris. The agreement, which entered into force upon its signature, grants ICHARM the status of an international centre under the auspices of UNESCO (Category 2) for a second six-year term.

It is important to cooperate with existing UNESCO water Centers such as IHE in the Netherlands, HidroEX in Brazil, IRTCES in China, HTC in Malaysia and RCUWM in Iran, Federal Institute of Hydrology (BfG) of Germany etc. The outline of ICHARM is as follows:

1) Mission: The mission of the Centre is to serve as the Global Centre of Excellence for Water Hazard and Risk Management by, inter alia, observing and analyzing natural and social phenomena, developing methodologies and tools, building capacities, creating knowledge networks, and disseminating lessons and information in order to help governments and all stakeholders manage risks of water-related hazards at global, national, and community levels. The hazards to be addressed include floods, droughts, landslides, debris flows, tsunamis, storm surges, water contamination, and snow and ice disasters. The Centre envision a Center of Excellence housing a group of leading people, superior facilities, and a knowledge base which enables conducting i) innovative research, ii) effective capacity building, and iii) efficient information networking. Based on these three pillars, ICHARM will globally serve as a knowledge hub for best national/local practices and an advisor in policy making.

2) Functions:

- (i) to promote scientific research and to undertake effective capacity-building activities at the institutional and professional levels;
- (ii) to create and reinforce networks for the exchange of scientific, technical and policy information among institutions and individuals;
- (iii) to develop and coordinate cooperative research activities, taking advantage particularly of the installed scientific and professional capacity of the IHP networks, WWAP, the IFI/P and relevant programmes of non-governmental organizations, international institutions and networks;
- (iv) to conduct international training courses for practitioners and researchers on the global level; and
- (v) to organize knowledge and information transfer activities including international symposia or workshops, and to engage in appropriate awareness-raising activities;

3) Structure: The center is established as a part of the Public Works Research Institute (PWRI) and operated under the responsibility of its Chief Executive.

Based on the 2013 renewed agreement between the UNESCO and the Government of Japan on ICHARM, the Governing Board was established. Following the first Governing Board meeting on February 25, 2014, the second meeting was held on 3 March 2016 and examined and adopted, “ICHARM Long-term (around 10 years) and Mid-term (around 5 years) Programmes” and the “ICHARM Work Plan (From April 2016 to March 2018)” that describes the detail of activity plan. Also reviewed is the “ICHARM Activity Report” dated from April 2014 to March 2016 (including the plan for March 2016). Following members are designated as the Governing Board Members from March 3, 2016 to the next board meeting;

Takashi Shiraiishi, President, National Graduate Institute for Policy Studies (GRIPS)

Korenfeld Federman, Past Chairperson, International Hydrological Programme Intergovernmental Council;

Robert Glasser, Special Representative of the Secretary-General for Disaster Risk Reduction, United Nations Office for Disaster Risk Reduction (UNISDR)

Shinichi Kitaoka, President, Japan International Cooperation Agency (JICA)

Koji Ikeuchi, Vice Minister for Engineering Affairs, Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

Takeo Uomoto (Chairperson), President, Public Works Research Institute (PWRI)

Irina Bokova, Director-General, United Nations Educational, Scientific and Cultural Organization (UNESCO)

See other information at: <http://www.icharm.pwri.go.jp/html/about/governingboard.html>

The events related to the ICHARM since April 2015 are summarized as below:

- (1) The 7th World Water Forum on 12-17 April 2015 in Daegu and Gyeongbuk, Korea
- (2) ADB (TA8456) Technical training (TM-3) for RRI model and storm surge model on 12-14 May 2015 at the Department of Meteorology and Hydrology (DMH) in Nay Pyi Taw, Myanmar
- (3) The workshops on sediment disasters and management on 25-26 May 2015 in Taipei, Taiwan
- (4) The 30th ISO/TC113 (the standardization of hydrometry, or measurement of liquid flow in open channels) meeting on 25-29 May 2015 at JSCE in Tokyo, Japan
- (5) The Integrated Research on Disaster Risk (IRDR) 13th Science Committee on 2-4 June 2015 in Qingdao, China

- (6) The 17th Governing Council Meeting of Asia-Pacific Water Forum on 10 June 2015 in Singapore
- (7) ADB (TA8456) Technical training (TM-4) for RRI model and storm surge model on 15-17 June 2015 at the Department of Meteorology and Hydrology (DMH), followed by DMH Consultation Meeting for Risk Assessment on 18 June 2015 in Nay Pyi Taw, Myanmar
- (8) The 26th International Union of Geodesy and Geophysics (IUGG) General Assembly on 22-28 June 2015 in Prague, Czech
- (9) The 2015 International Workshop on Typhoon and Flood (IWTF) on 27-29 June 2015 in Taipei, Taiwan
- (10) The Expert Meeting on Developing Indicators for Disaster Risk Reduction by UNISDR on 27-29 July 2015 at the United Nations Geneva Office in Geneva, Switzerland
- (11) Workshops on Risks and Impacts on Floods from Extreme Events in ASEAN countries on 5 August 2015 in Bali, Indonesia
- (12) The Workshop “Evidence based forecasting of monsoon driven floods in transboundary rivers of Pakistan” on 6-7 August 2015 in Lahore, Pakistan
- (13) The Workshop on “Strengthening Water Partnerships for Climate Change and Disaster Risk Management” on 11 August 2015 at the ADB headquarters in Manila, the Philippines
- (14) The Workshop on “South-South Cooperation at Regional Level for Modelling and Managing Hydro-Hazards” hosted by the UNESCO Jakarta Office on 31 August -1 September 2015 in Jakarta, Indonesia
- (15) WMO APFM Advisory Committee and Management Committee on 7-8 September 2015 in Geneva, Switzerland
- (16) ICHARM’s Director Prof. Koike was awarded the Science Award by the Japan Society of Hydrology and Water Resources on 10 September 2015
- (17) Field survey for research project on observation of large-scale inundation area on 17 September 2015 in Joso City, Japan
- (18) The workshop for the UNESCO project “Enhancing natural Hazards resilience in South America (ENHANS)” on 21-22 September 2015 in Lima, Peru
- (19) The 4th Conference of the Taiwan Integrated Research Programme on Climate Change Adaptation Technology on 24-25 September 2015 in Taiwan
- (20) IFAS Workshop hosted by JICA and the ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre) in Jakarta, Indonesia on 5-9 October 2015
- (21) The 11th APRU Research Symposium on Multi-Hazards around the Pacific Rim (APRU 2015) on 7-11 October 2015 in Tacloban, the Philippines
- (22) Interim meeting of ADB (TA8456) project, convened on 14 October 2015 in Nay Pyi Taw, Myanmar
- (23) ADB (TA8456) workshop on Flood Hazard Mapping on 15 October 2015 in Nay Pyi Taw, Myanmar
- (24) ADB (TA8456) follow-up training (1) for RRI model and storm surge model on 12-16 October 2015 at the Department of Meteorology and Hydrology (DMH)
- (25) ICHARM’s Advisor Prof. Takeuchi was doubly awarded for the long-term leadership and commitment in the field of water management by the UNESCO IHP regional steering committee for Southeast Asia and the Pacific on 20 and 21 October 2015 in Medan, Indonesia
- (26) Joint International Flood Initiative (IFI) and International Drought Initiative (IDI) session during the international symposium in conjunction with the 23rd Session of the IHP Regional Steering Committee (RSC) for Southeast Asia and the Pacific on 21 October 2015 in Medan, Indonesia
- (27) The 10th Integrated Workshop of the UNESCAP/WMO Typhoon Committee session on 26-29 October 2015 in Malaysia
- (28) International Geographical Union Conference on 17-21 August 2015 in Moscow ,Russia
Hazard and risk commission session (Anthropogenic influence on natural hazards and risk)
Hazard and risk commission session (Natural hazards and risks in Arctic and cold region environment)
- (29) The Expert Group Meeting on Regional Strategies towards Building Resilience to Disaster in the Asia and Pacific hosted by UNESCAP on 26-28 October 2015 in Bangkok, Thailand
- (30) The Sixth Meeting of High-level Experts and Leaders Panel on Water and Disasters (HELP) on 17 November 2015 at the UN headquarters in New York, USA

- (31) The 2nd United Nations Special Thematic Session on Water and Disasters on 18 November 2015 at the UN headquarters in New York, USA
- (32) The final session of the United Nations Secretary General's Advisory Board on Water and Sanitation (UNSGAB) on 19 November 2016 at the UN headquarters in New York, USA
- (33) The special session to enhance existing UNESCO activities of the International Flood Initiative (IFI) and the International Drought Initiative (IDI) organized by the UNESCO Jakarta Office during the 21st International Congress on Modelling and Simulation (MODSIM) on 29 November – 4 December 2015 in Queensland, Australia
- (34) The JICA side event and UNESCO side event at the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) on 30 November and 2 December 2015 respectively in Paris, France
- (35) The workshop for the UNESCO project “Enhancing natural Hazards resilience in South America (ENHANS)” on 10-11 December 2015 in Montevideo, Uruguay
- (36) The IFAS training session “Training Workshop on Warning Systems and Geographical Information Systems (GIS) Courses” hosted by UNESCO Cairo Office in Cairo, Egypt on 15-16 December 2015
- (37) Signing Memorandum of Understanding to establish a framework for research cooperation and related activities with the Research Center for Reinforcement of Resilient Function, National Research Institute for Earth Science and Disaster Prevention (NIED) on 16 December 2015 in Tsukuba, Japan
- (38) The workshop “Meaning and Characterizing River Morphology for Hindcasting and Forecasting River Responses to Major Floods” as part of UNESCO Pakistan Project (Phase II) on 21-22 December 2015 in Islamabad, Pakistan
- (39) ADB (TA8456) follow-up training (2) for RRI model and storm surge model on 25-28 January 2016 at the Department of Meteorology and Hydrology (DMH)
- (40) ADB (TA8456) Workshop on Flood Hazard Mapping in Three Target Cities on 25 to 28 January 2016 in Yangon, Mandalay, and Mawlamyine
- (41) The Second Open-ended Intergovernmental Expert Working Group by UNISDR on 9-11 February 2016 at the United Nations Geneva Office in Geneva, Switzerland
- (42) The 48th Session of the UNESCAP/WMO Typhoon Committee session on 21-27 February 2016 in Hawaii, USA
- (43) The first Governing Board meeting of the Regional Training Sector for Water Resources and Irrigation (RCTWS), a UNESCO Category II center on 27 February 2016 in Cairo, Egypt
- (44) Asian Water Cycle Symposium (AWCS2016) co-organized with Asian Water Cycle Initiative, Tokyo, Japan, 1-2 March 2016
- (45) The 2nd Collaboration Dialogue Workshop between Indonesia and Japan on Water and Disaster Management on 7 March 2016 in Jakarta, Indonesia
- (46) Field Survey on fluvial topography and floods around the Tonle Sap Lake on 8-11 March 2016 in Cambodia
- (47) The Workshop on Practical Application of Rainfall Runoff Inundation (RRI) Model on 14-18 March 2016 at the San Roque Dam, San Manuel, Pangasinan in the Philippines
- (48) ADB (TA8456) follow-up training (3) for RRI model and storm surge model on 30 March to 6 April at the Department of Meteorology and Hydrology (DMH)
- (49) ADB (TA8456) Final workshop on 23 May at the Department of Meteorology and Hydrology (DMH)

1.4 Educational and training courses

1.4.1 Contribution to IHP courses

The UNESCO IHP Japan Training Course (TC) was initiated as UNESCO IHP Nagoya Training Course by Nagoya University in 1991 and has been held every year since then. Topics of the course are selected to fit the IHP themes. The host or convener body is the Hydrospheric Atmospheric Research Center (HyARC), Nagoya University (Note that the HyARC has been reorganized as the ISEER (Institute for Space-Earth Environmental Research, Nagoya University) since 1 October 2015). After the 19th TC, the Water Resources Research Center, Disaster Prevention Research Institute

(DPRI), Kyoto University joined as a co-convenor both Nagoya University and Kyoto University are taking the convenor role alternatively. This made the TC have wider scope including water resources and disaster prevention. About ten participants from East and Southeast Asian countries selected by UNESCO Jakarta Office take lectures and practices every year in the training course.

An important development of TC is information dissemination on website. The broadcasting of the lectures to universities in Asia via the Internet was successfully performed with help of Keio University and collaboration with EST (Engineering, Science, and Technology) programme. When the visiting participants and some graduate school students join the TC's, the number is limited as only 10-20. The lectures are now available via the Internet, and many participants at remote sites can join the TC. The lectures are also open to graduate school students staying at universities in Japan. Since the TC is a good opportunity for graduate school students to learn various kinds of hydrology, water resources and disaster-related issues with trainees from abroad, the convenors of TC encourage graduate students to join the TC.

1.4.2 Organization of specific courses

ICHARM has been conducting a one-year master's program, "Water-related Disaster Management Course of Disaster Management Policy Program," since 2007 in collaboration with JICA and the National Graduate Research Institute for Policy Studies (GRIPS). The doctoral program in disaster management started in October 2010 in collaboration with GRIPS.

ICHARM has been providing a short-term training course with JICA as Capacity Development for Flood Risk Management. This training program was launched in FY2012 and designed to provide opportunity for meteorologists, river administrators and disaster management officers in flood-vulnerable developing countries to learn the use of the Integrated Flood Analysis System (IFAS), developed and upgraded by ICHARM. The other important purposes are to learn about disaster management and evacuation plans and flood response cases in Japan, and to develop an action plan for local flood management of flood-vulnerable areas in the participants' countries. These training activities aim to enhance individual flood-coping capacities and eventually to contribute to flood damage mitigation in the countries.

1.5 Cooperation with the UNESCO-IHE Institute for Water Education and/or international/regional water centres under the auspices of UNESCO

- The 25th IHP Training course textbook, "Risk Management of Water-related Disasters under Changing Climate", on December 2015, Water Resources Research Center, DPRI, Kyoto Univ.
- An IHE representative (Mr. Biswa Bhattacharya, Senior Lecturer in Hydroinformatics) was invited to Kyoto, Japan to attend: Global Alliance of Disaster Research Institutes (GADRI) Workshop on 13 October 2015 and The First International Symposium on Flash Floods in Wadi Systems (ISFF) on 14-15 October 2015, held in Uji Campus, Kyoto University.
- International Summer Program on Sustainable Water Management in an Era of Big Data will be held at The University of Tokyo and ICHARM, 25 July – 5 August, 2016.

1.6 Participation in international scientific meetings

1.6.1 Meetings hosted by the country

- UNESCO International Symposium: Scientific, Technological and Policy Innovations for Improved Water Quality Monitoring in the Post-2015 SDGs Framework, Kyoto-Otsu, Japan, 15-18 July 2015 [Yamashiki, Takara, Tsujimura]
- Global Alliance of Disaster Research Institutes (GADRI) Workshop "Round Table Discussion: Towards an Integrated Disaster Risk Research Platform for Hydro-Meteorological Hazards" organized by DPRI, Kyoto University on 13 October 2015.
- The First International Symposium on Flash Floods in Wadi Systems (ISFF): Disaster Risk Reduction & Water Harvesting in the Arab Region, Uji Campus, Kyoto University, on 14-15 October 2015.
- The 7th International Conference on Water Resources and Environment Research (7th ICWRER), Kyoto, Japan, 5-9 June 2016.

1.6.2 Participation in meetings abroad

- The 7th World Water Forum 2015, 12-17 April 2015, Daegu and Gyeongju, Korea [Takeuchi, Koike, Tachikawa]
- The 15th IWRA World Water Congress "Global Water, a resource for development : opportunities, challenges and constraints" in Edinburgh, Scotland, UK, 25-29 May 2015 [Takara, Nakayama]
- The World's Large Rivers Initiative (WLRI) Meeting, Vienna, Austria, 25-26 June 2015 [Nakayama]
- The 26th IUGG General Assembly in Prague, Czech Republic, 22 June - 2 July 2015 [Taniguchi, Tsujimura]
- The 12th Annual Meeting of Asia Oceania Geosciences Society (AOGS2015) and the 7th APHW in Singapore, 1-7 August 2015 [Takara, Nakayama, Kawamura, Tsujimura, Sayama]
- The 42nd IAH (International Association of Hydrogeologists) Congress in Rome, Italy, 13th – 18th September 2015 [Taniguchi, Tsujimura]
- Asian G-WADI (Global Network on Water and Development Information for Arid Lands) and International Draught Initiative (IDI) held 6th Asian G-WADI and 1st IDI Expert Group Meeting, 13th – 16th June 2015, Tehran, Iran [Tsujimura, Koike]
- The 23rd Session of the IHP Regional Steering Committee (RSC) for Southeast Asia and the Pacific held at Medan, Indonesia on 19-22 October 2015 [Takara, Koike, Tachikawa, Kawamura, Tsujimura, Sayama]
- Joint International Flood Initiative (IFI) and International Drought Initiative (IDI) session during the international symposium in conjunction with the 23rd Session of the IHP Regional Steering Committee (RSC) for Southeast Asia and the Pacific on 21 October 2015 in Medan, Indonesia [Koike]
- The 22nd session of the Intergovernmental Council, Paris, 13-14 and 16-17 June 2016 [Takara, Koike, Tachikawa, Yamashiki, Sayama]

2. FUTURE ACTIVITIES

2.1 Activities planned until December 2016

- The 26th IHP Training Course with the theme “Coastal Vulnerability and Freshwater Discharge” will be held at HyARC, Nagoya Univ., 27 November to 10 December, 2016.
- The 24th Session of the IHP Regional Steering Committee (RSC) for Southeast Asia and the Pacific will be held at Mongolia on 24-26 October 2016.

2.2 Activities foreseen for 2017-2018

- The 3rd Global Summit of Research Institutes for Disaster Risk Reduction will be held in Kyoto University, March 2017.
- A faculty development workshop for “International Program on Resilient Society Development under Changing Climate” under Re-inventing Japan Project supported by MEXT will be held at Kyoto, March 2017.

2.3 Activities envisaged in the long term

- The 26th IHP Training Course with the theme “Coastal Vulnerability and Freshwater Discharge” will be held at HyARC, Nagoya Univ., 27 November to 10 December, 2016.
- Participation in IHP-VIII projects and RSC activities.
- Activities relating to “Sustainability Science” that is a key promotion by the Japanese Commission for UNESCO.
- Information dissemination through a web page of the National Committee.
<http://hywr.kuciv.kyoto-u.ac.jp/ihp/japan/index.html>
- Information dissemination through a web page of the IHP RSC for Southeast Asia and the Pacific.
<http://hywr.kuciv.kyoto-u.ac.jp/ihp/rsc/index.html>

REPORT OF THE INDONESIAN NATIONAL COMMITTEE OF IHP

1. ACTIVITIES UNDERTAKEN IN THE PERIOD June 2014 – September 2016

1.1 Meetings of the IHP National Committee

1.1.1. Decisions regarding the composition of the IHP National Committee

The new organizational structure of the Indonesian National Committee for IHP consist of a Chairman, 5 Vice Chairman, two Secretaries, 5 Working Group Coordinators and members from various research institutes, universities and sectoral-Ministries.

The composition of the National Committee is:

Chairman	: Dr. Ir. Zainal Arifin, MSc
Vice Chairman I	: Dr. Ir. Arie Setiadi Moerwanto, M.Sc (Ministry of Public Work and Housing)
Vice Chairman II	: Ir. F.X Sutijastoto, MA (Ministry of Energy and Mineral Resources)
Vice Chairman III	: Dr. Hilman Nugroho (Ministry of Environment and Forestry)
Vice Chairman IV	: Prof. Dr. Hery Harjono (APCE – UNESCO)
Vice Chairman V	: Prof. Dr. Arief Rachman (Ministry of Education and Culture)
Secretary I	: Dr. Ir. Fauzan Ali, MSc
Secretary II	: Nur Trie Aries, MA
Working Group I Coordinator	: Dr. William Putuhena
Working Group II Coordinator	: Ir. Rudy Suhendar, M.Sc
Working Group III Coordinator	: Ir. Hermono Sigit
Working Group IV Coordinator	: Dr. Ignasius D.A. Sutapa, MSc.
Working Group V Coordinator	: Secretary of INATCOM
Members:	
1. Prof. Drs. Agus Subekti MSc, PhD	: Ministry of Education and Culture
2. Ir. Dodid Murdohardono, MSc	: Ministry of Energy and Mineral Resources
3. Drs. Endro Santoso, MSi	: BMKG
4. Drs. Arko Hananto Budiadi	: Ministry of Foreign Affairs
5. Dr. Titi Anggono	: Indonesian Institute of Sciences (LIPI)
6. Dr. Ir. M. Rahman Djuwansah	: Indonesian Institute of Sciences (LIPI)
7. Ir. Sudaryati Cahyaningsih	: Indonesian Institute of Sciences (LIPI)
8. Dr. Budi Kartiwa	: Ministry of Agriculture
9. Ir. Imam Anshori, MT	: National Water Resources Council
10. Dr. Sutopo Purwo Nugroho	: National Bureau of Disaster Management BNPB)
11. Drs. Budi Suhardi, DEA	: BMKG
12. Dr. Armi Susandi	: National Climate Change Council (DNPI)
13. Dr. Saiful Anwar	: Ministry of Environment and Forestry

The committee hold bimonthly coordination meetings and in addition several technical meetings as needed for the planning and implementation of seminars and workshops organized under coordination of the committee. The committee routine meetings is attended by the Chairman of the Indonesian Committee for UNESCO and by Program Specialist of the UNESCO Jakarta Office. Members of the national committee through regular meetings distribute informations gathered during the meeting as well as report to the meeting hydrological and related activities in their organizations.

1.1.2. Status of IHP-VIII activities

Theme 1. **WATER-RELATED DISASTERS AND HYDROLOGICAL CHANGE**

1. Risk management as adaptation to global changes
 - Impacts of landuse and climate change on hydrologic regime on a watershed
 - Studies on water resources carrying capacity (WRCC)
2. Understanding coupled human and natural processes
3. Benefiting from global and local Earth observation systems
4. Addressing uncertainty and improving its communication
5. Improve scientific basis for hydrology and water sciences for preparation and response to extreme hydrological events

Theme 2. **GROUNDWATER IN A CHANGING ENVIRONMENT**

1. Enhancing sustainable groundwater resources management
 - Implementing of ASRG Technology for groundwater recharge in industrial areas, urban areas by RC for Geotechnology – LIPI
2. Addressing strategies for management of aquifers recharge
3. Adapting to the impacts of climate change on aquifer systems
4. Promoting groundwater quality protection
 - Research Center for Physic - Indonesian Institute of Sciences (LIPI) conduct research on Groundwater identification for community and economy in Serang, Province of Banten
5. Promoting management of transboundary aquifers

Theme 3 **ADDRESSING WATER SCARCITY AND QUALITY**

1. Improving governance, planning, management, allocation, and efficient use of water resources
2. Dealing with present water scarcity and developing foresight to prevent undesirable trends
3. Promoting tools for stakeholders involvement and awareness and conflict resolution
4. Addressing water quality and pollution issues within an IWRM framework - improving legal, policy, institutional, and human capacity
 - Research Center for Limnology-Indonesian Institute of Sciences (LIPI) conduct research on water resources management in Saguling Demosite, West Java
5. Promoting innovative tools for safety of water supplies and controlling pollution

Theme 4. **WATER AND HUMAN SETTLEMENTS OF THE FUTURE**

1. Game changing approaches and technologies
2. System wide changes for integrated management approaches
3. Institution and leadership for beneficiation and integration
4. Opportunities in emerging cities in developing countries

5. Integrated development in rural human settlement

Theme 5. ECOHYDROLOGY, ENGINEERING HARMONY FOR A SUSTAINABLE WORLD

1. Hydrological dimension of a catchment– identification of potential threats and opportunities for a sustainable development
2. Shaping of the catchment ecological structure for ecosystem potential enhancement – biological productivity and biodiversity
3. Ecohydrology system solution and ecological engineering for the enhancement of water and ecosystem resilience and ecosystem services
 - APCE-UNESCO promote research and develop Ecohydrology Demosite in Saguling Reservoir, in West Java
 - APCE-UNESCO promote research on sustainable management of peatland in ex-megarice project, Central Kalimantan
4. Urban Ecohydrology – storm water purification and retention in the city landscape, potential for improvement of health and quality of life
5. Ecohydrological regulation for sustaining and restoring continental to coastal connectivity and ecosystem functioning

Theme 5. **WATER EDUCATION, KEY FOR WATER SECURITY**

1. Enhancing tertiary water education and professional capabilities in the water sector
 - Basic hydrological training for the water resources managers of the river area
 - Centre River Basin Organization Management (CRBOM) establishment as a center that will facilitate the implementation of experience in water resources management based on river basin carried out by the RBO (River Basin Organization)
 - Commemorating the world water day (Ministry of Public Works), Exhibition, National seminar (opened by the Minister of Public Works), discussions with awardees good water management
 - Ministry of Environment: Management of rivers and lakes
2. Addressing vocational education and training of water technicians
3. Water education for children and youth
 - APCE-UNESCO promote water quality protection for elementary school students during world water day celebration event
4. Promoting awareness of water issues through informal water education
5. Education for transboundary water cooperation

1.2. Activities at national level in the framework of the IHP

- National Seminar of Limnology : Management of 15 Priority Lakes in Indonesia
- FGD evaluation and implementation of management programs 15 Priority Lakes in Indonesia in 2014 and 2015

1.2.1. National/local scientific and technical meetings

- Hearings with the House of Representatives Commission VII, on the research of 15 priority Lakes in Indonesia
- Technical Meeting to construct Government Regulation of water resources management in Indonesia

- Technical Meeting to construct Government Regulation of mangrove and wetland areas zonation
- Technical Meeting with the Ministry of Marine Affairs and Fisheries to identify the potential resources of 15 priority lakes in Indonesia
- Meeting with the Ministry of Education and Culture, and Indonesia National Committee for Unesco

1.2.2. Participation in IHP Steering Committees/Working Groups

Annual meetings of the Regional Steering Committee for IHP in the Asia Pacific region are held in rotational base locations. Indonesia has always participated in these yearly meetings.

1.2.3. Research/applied projects supported or sponsored

RC for Limnology – Indonesian Institute of Sciences :

- Development of Saguling Reservoir Demo-site

RDC for Water Resources – Ministry of Public Works

- Flood forecasting and warning system
- Area reduction factor in West Jawa
- Rainfall runoff relationship for flood analysis
- Hydrological characteristics and the erosion rate as a function of land use change
- Balance and utilization of water resources strategy
- Balance and allocation of water in Indonesia
- Forecasts and drought control in the River watershed of Pemali Comal
- Development of flood and drought risk map of the Java island
- Raw water supply technology development in East Java

1.2.4 Collaboration with other national and international organizations and/or programmes

- Biovillage development in Giam Siak Kecil – Bukit Batu Biosphere Reserve in collaborate with MAB – Unesco : Promoting Alternative Technology To Provide Clean Water In Peat land Area
- Development of Peat Water Treatment Technology To Provide Clean Water In Peat land Area in colaboration with Katingan Prefecture – in Central Kalimantan
- Committee member of the National Congress of Sciences especially in water field

1.2.5. Other initiatives

1.3. Educational and training courses

1.3.1. Contribution to IHP courses

- APCE-UNESCO hosted IHP training course in Yogyakarta in November 8-9, 2014

1.3.2. Organization of specific courses

1.3.3. Participation in IHP courses

- 15 participants form Indonesia IHP jointed the IHP training course held in Yogyakarta in November 2014.

- 1.4. Cooperation with the UNESCO-IHE Institute for Water Education and/or international/regional water centres under the auspices of UNESCO
- 1.5. Publications
 - Proceeding International Conference on Ecohydrology (ICE) “Ecohydrology Approaches Facing the Global Water Environment Challenges”, with 50 papers.
- 1.6. Participation in international scientific meetings
 - 1.6.1. Meetings hosted by the country
 - IHP Training Course in Yogyakarta, November 8 – 9, 2014
 - International Conference on Ecohydrology, Yogyakarta, November 10 – 12, 2014
 - 22nd RSC Meeting of IHP in Yogyakarta, November 13 – 14, 2014
 - Meeting of APCE-UNESCO Governing Board member, Yogyakarta, November 12, 2014
 - Strategic Meeting and International Workshop of UNESCO, Jakarta 11-12 March 2015
 - World Water Day Workshop March 24, 2015 in Jakarta
 - Meeting of Taman Lorentz Papua World Heritage, in Jakarta
 - Workshop “Ecohydrology and Lake Ecosystem, collaboration of APCE – P2Limnologi – ILEC – Shiga University in June, 2 2014 in Cibinong
 - 23rd RSC Meeting of IHP in Medan, November 2015
 - 1.6.2. Participation in meetings abroad
 - Ecohydrology Steering Committee Meeting in Paris May, 20 – 21, 2014
 - IGC Meeting of IHP in Paris June 2014
 - International Seminar on Landscape and Sustainable water resources management di Canberra Australia, June, 2014
 - International Water Diplomacy Meeting Koblenz – Germany, November 2014
 - World Lake Conference 2014 in September 2014, Perugia
 - Meeting of Indonesia Delegation with ILEC related to WLC16, 3 September 2014 di Perugia
 - World Water Forum in Daegu, Korea, in May 2015
 - Unesco Water Family Centres and Chairs Meeting in Kuala Lumpur, Malaysia, in March 2015
 - COP21 Meeting in Paris, December 2015
 - International Symposium of Ecohydrology in Lyon France, in November 2015
 - THA 2015 International Conference on “Climate Change and Water & Environment Management in Monsoon Asia”, Bangkok – Thailand, January 28-30, 2015
 - Japan-Asia Youth Exchange Program in Science (Sakura Exchange in Sciences) (3rd -12nd March 2015
 - Unesco Water Family Centres Coordination Meeting in Beijing – China, May 2016
 - Unesco Water Family Centre Meeting in Tehran, Iran, March 2016
- 1.7. Other activities at regional level
 - 1.7.1. Institutional relations/cooperation

1.7.2. Completed and ongoing scientific projects

2. FUTURE ACTIVITIES

2.3. Activities planned until December 2016

- Participation in IHP-Training course
- Collaboration meeting of IHP and MAB in Bali 2016
- Development and inauguration of Saguling Demosite, 29 October 2016
- Workshop of Ecohydrology in Yogyakarta 12 – 14 October 2016
- Workshop of Ecohydrology in Kefamenanu TTU, NTT, 18 – 19 October 2016

2.4. Activities foreseen for 2017-2018

- Asia Pacific Centre for Ecohydrology, Indonesian National Committee for IHP-UNESCO, Indonesian Institute of Sciences, Indonesian National Committee of Indonesia, will continue to conduct on going research on Ecohydrology Demosite “Sediment Deposition System on Saguling Reservoir”
- Participation in IHP-RSC meeting Asian Pacific FRIEND
- Participation in IHP-Training course
- Conducting International seminar on Ecohydrology, in cooperation with the Ministry of Education and Culture of Indonesia
- Conducting regional training on ecohydrology, in cooperation with UNESCO Jakarta Office and KNIU

2.5. Activities envisaged in the long term

- Participation in IHP-RSC activities and IHP Intergovernmental Council meetings.

NATIONAL REPORT ON IHP RELATED ACTIVITIES

Name of the Centre		UNESCO - International Hydrological Programmes Malaysia
Name of Chairman		Dato Ir. Hj. Zulkefli bin Hassan
Name and title of contact person (for cooperation)		Ir. Hj. Ab. Qahar bin Osman
E-mail		ihp@water.gov.my / ab.qahar@water.gov.my mrazali@water.gov.my / shikin@water.gov.my nasarudin@water.gov.my
Address		Water Resource and Hydrology Division, Dept. of Irrigation and Drainage Malaysia, KM 7 Jalan Ampang, 68000 Kuala Lumpur.
Website		h2o.water.gov.my/ihp
Location of centre		City/town : <u>Kuala Lumpur</u> country : <u>Malaysia</u>
Geographic orientation *		Regional
Year of establishment		1975
Themes	Focal Areas ♦	<input checked="" type="checkbox"/> groundwater <input checked="" type="checkbox"/> urban water <input checked="" type="checkbox"/> arid / semi-arid zones <input checked="" type="checkbox"/> humid tropics <input checked="" type="checkbox"/> droughts and floods <input checked="" type="checkbox"/> sediment transport and management <input checked="" type="checkbox"/> water and environment <input checked="" type="checkbox"/> ecohydrology <input checked="" type="checkbox"/> water law and policy <input checked="" type="checkbox"/> transboundary river basins/ aquifers <input checked="" type="checkbox"/> IWRM <input checked="" type="checkbox"/> global and climate change <input checked="" type="checkbox"/> mathematical modelling <input checked="" type="checkbox"/> social and cultural dimensions of water <input checked="" type="checkbox"/> water education <input checked="" type="checkbox"/> other: <u>stormwater management,</u> <input checked="" type="checkbox"/> <u>water hazard.</u>
	Scope of Activities ♦	<input type="checkbox"/> vocational training <input type="checkbox"/> postgraduate education <input type="checkbox"/> continuing education <input checked="" type="checkbox"/> research <input checked="" type="checkbox"/> institutional capacity-building <input type="checkbox"/> advising/ consulting <input type="checkbox"/> software development <input type="checkbox"/> other: (please specify) _____
Support bodies 1		The Government of Malaysia

Hosting organization 2	Department of Irrigation and Drainage Malaysia/ Ministry of Natural Resources and Environment
Sources of financial support 3	The Government of Malaysia/ UNESCO National Commission of Malaysia
Existing networks and cooperation 4	UNESCO/ICHARM/RCUWM/RSC for Southeast Asia and The Pacific/ Partner of the GWP/ IWA/ APAC Water-related Centre Category II/MyWP/Malaysian Stormwater Organization / AWGWRM
Governance	<input checked="" type="checkbox"/> Director and Governing board <input type="checkbox"/> other: Frequency of meetings: 2x-3x every year <input type="checkbox"/> Existence of UNESCO presence at meetings (UNESCO Jakarta Office)
Institutional affiliation of director	IWA/IAHS/Partner of the GWP/Malaysia Nuclear Agency/MyWP/ Board of Engineers Malaysia
Number of staff and types of staff	Total number of staff (full-time, or equivalent) :Full time : 3 persons, on the need basis: up to 15 person Number of staff who are water experts: 3 persons. Number of visiting scientists and postgraduate students: 3-5 persons.
Annual turnover budget in USD	Operational = USD 30,000.00 Programmes and Activities = USD 100,000.00

* check on appropriate box

◆ check all that apply

1 please specify bodies that cover the operational costs of the centre, and other essential costs such as salaries and utility bills, and that provide institutional support to ensure centre's sustainability

2 if different from support bodies

3 please specify sources of main budgetary and extrabudgetary funds to implement projects

4 please write international networks, consortiums or projects that the centre is part of, or any other close links that the centre has with international organizations or programmes, which are not already mentioned above

ABOUT UNESCO – IHP MALAYSIA

1.0 BACKGROUND

- ❑ UNESCO-IHP (International Hydrological Programme) Malaysia is an entity of the cooperation program between government agencies under UNESCO's membership of more than 40 Ministries, Departments and Institutions of Higher Learning related to water in Malaysia.
- ❑ Program established in 1975, led by the Department of Irrigation and Drainage Malaysia.
- ❑ The main function of this committee is to coordinate the investigation, research and information gathering hydrological besides advising the government on the adoption of national water resources.

2.0 OBJECTIVES

The objectives of the UNESCO – IHP Malaysia are:

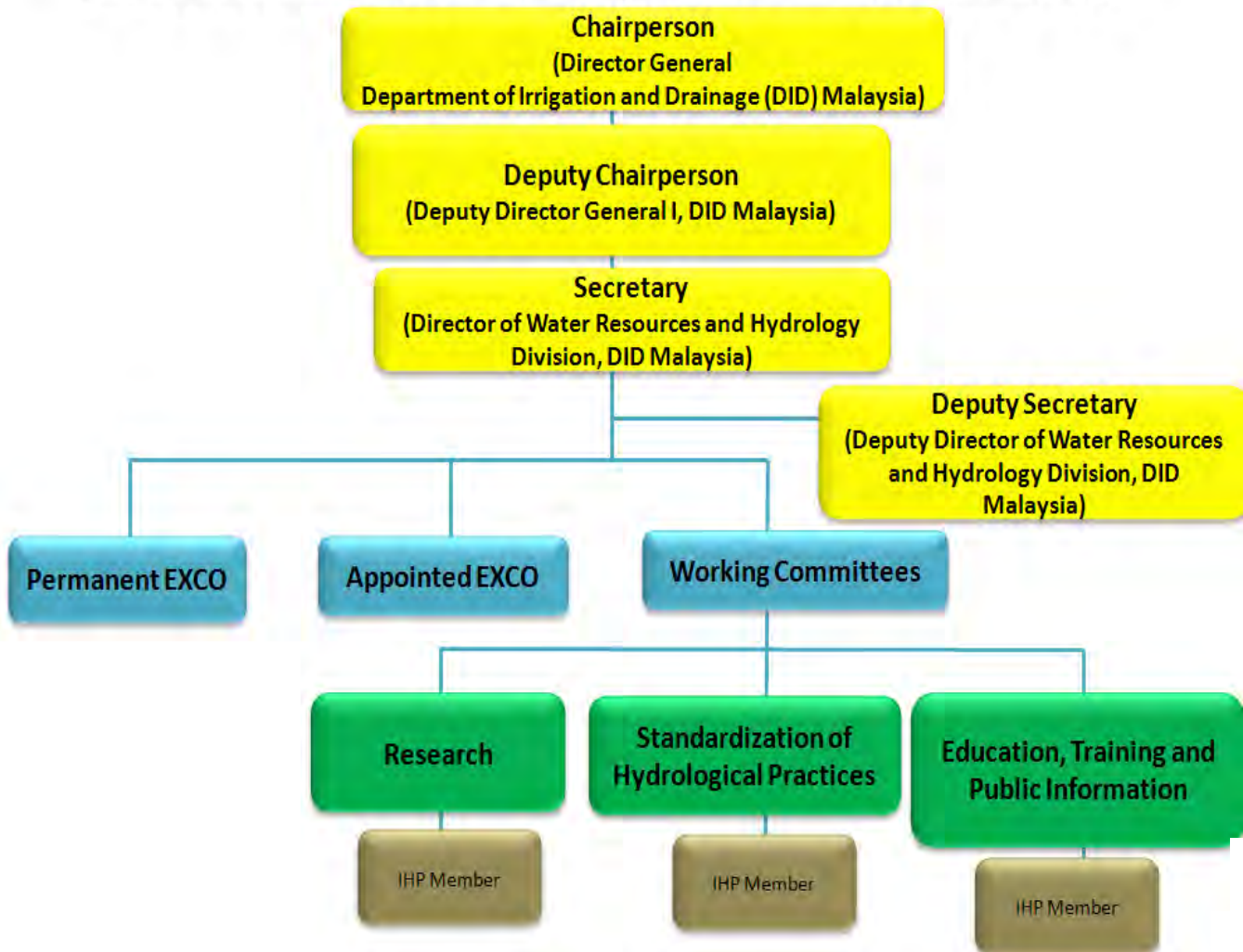
- i. To represent Malaysia on all issues related to programmes of IHP under the UNESCO and participate actively in those programmes
- ii. To promote and coordinate research programmes on hydrology and water resources in the country and region
- iii. To promote and coordinate practices on hydrology and water resources
- iv. To promote and coordinate programmes on education, training and public information on hydrology and water resources.

3.0 ORGANIZATION STRUCTURE

The programme structure of the Malaysia National Committee for IHP is as follow:-

- a) The Chairman
- b) The Vice Chairman
- c) The Committee Secretary supported by a Vice Secretary
- d) Eight (8) Executive Committees (EXCO) members and
- e) Other partners members (as listed in Appendix A)

EXECUTIVE COMMITTEE (EXCO) OF UNESCO-IHP MALAYSIA



The present composition of the UNESCO-IHP Malaysia Committee is as follows:

<p>Chairperson</p> <p>Director General, Department of Irrigation and Drainage (DID) Malaysia Dato' Ir. Hj Zulkefli Hassan</p> <p>Deputy Chairperson TBA</p>	<p>Secretary</p> <p>Director Division of Water Resources and Hydrology, DID Malaysia Ir. Hj. Qahar bin Osman</p>	<p>Deputy Secretary</p> <p>Deputy Director Division of Water Resources and Hydrology, DID Malaysia Ir. Hj Mohd Razali bin Husain</p>
<p>Permanent EXCO</p> <p>Department of Irrigation and Drainage (DID) Malaysia <i>Y.Bhg. Dato' Ir. Hj. Nassir bin Bidin</i></p> <p>Malaysian National Commission for UNESCO (MNCU) <i>En. Mohd Khairul Adib Abd Rahman</i></p> <p>Ministry of Science, Technology & Innovation <i>TBA</i></p> <p>UNESCO-Humid Tropics Center Kuala Lumpur <i>TBA</i></p>	<p>Appointed EXCO</p> <p>Ministry of Energy, Green Technology and Water <i>Datuk Harjeet Singh a/l Hardev Singh</i></p> <p>Ministry of Natural Resources and Environment <i>Azizah binti Ariffin</i></p> <p>Ministry of High Education Malaysia <i>TBA</i></p> <p>University of Technology Malaysia <i>Prof. Zulkifli Yusof</i></p> <p>Perbadanan Putrajaya <i>En. Ahmad Zubir bin Sopian</i></p>	<p>Working Committee</p> <p>a) Research Chairperson - UNESCO-Humid Tropics Center Kuala Lumpur <i>TBA</i> Deputy Chairperson - Institut Peny. Hidraulik Kebangsaan Malaysia <i>TBA</i></p> <p>b) Standardization of Hydrology Practices Chairperson - Jabatan Pengairan dan Saliran Malaysia <i>Ir. Hj Ab. Qahar bin Osman</i> Deputy Chairperson Universiti Tenaga Nasional <i>TBA</i></p> <p>c) Education, Training and Public Information Chairperson - Universiti Sains Malaysia <i>Prof. Madya. Dr. Nabsiah Abd Wahid</i> Deputy Chairperson - Universiti Institut Teknologi MARA <i>Dr. Janmaizatulriah Jani</i></p>

4.0 UNESCO-IHP MALAYSIA SECRETARIAT

The Secretariat provides secretarial support and many other supporting roles for all activities carried out by MIHP. It includes:-

- i. Planning and managing all EXCO meetings including preparation of minutes, logistics needs and slides presentation;
- ii. Provide secretariat support and act as liaison officers in organisation of student camps including transfers of funds;
- iii. Provide secretariat support and provide input in planning and execution of World Day for Water events and other related events;
- iv. Organisation of three technical talks session per year;
- v. Preparation of all documentation for UNESCO IHP related proposal;
- vi. Organisation of events to raise funds for IHP Malaysia;
- vii. Managing IHP Secretariat including looking into finance, office documentation, web page and *Facebook* accounts and others.

The MIHP office is currently managed by five officers on a full time basis:-

- Ir. Haji Mohd. Razali Husain : Deputy Director
- Haji Mohamad Shiham Ab Ghapar : Senior Engineer
- Dr Asnor Muizan Ishak : Senior Engineer
- Mrs. Norashikin Abdullah : Engineer
- Mr Nasaruddin Nazir : Assistant Engineer
- Mr. Hairul Anuar Mohammad : Assistant Engineer
- Mrs. Siti Zakirah Baharom : Assistant Engineer

**UNESCO – IHP ACTIVITIES
FROM OCTOBER 2015 – SEPTEMBER 2016**

1.0 MEETINGS

1.1 ANNUAL GENERAL MEETING (AGM)

As of 2010, IHP Malaysia did not hold any more AGM but consider one of the EXCO meetings held as the AGM. The Administration Procedures of IHP Malaysia also requires that the Non-Permanent EXCO and the chairman and vice person of the working committee Members Committee to be elected every two years and at EXCO meeting, the nomination and selection was made.

1.2 THE NATIONAL COMMITTEE MEETING

The National Committee on average holds three annual coordination meetings. The Working Committee and special committee set up for special assignment hold more regulars meeting.

The National Committee meeting is normally attended by the Chairman, the Permanent and Non-permanent EXCO members as well as the Partner Members of Malaysia Committee of IHP. In this meeting, all past activities were reported and proposed activities are tabled.

The objective of the meetings is review program and activities and to align them with IHP objectives. It also looks into proposed collaboration with other organisation within the country.

The partners of UNESCO – IHP Malaysia are relevant water related ministries, Government departments and agencies, water research institution, universities, and government-led private entities. Meetings were periodically held to discuss and implement programs and projects in line with the IHP—VIII (2014-2021) UNESCO strategic plan. More projects related to IHP-VIII themes are to be supported by Ministry of Natural Resources and Environment, Ministry of Science and Innovation and Malaysian National Commission for UNESCO (MNCU) through IHP National Committee.

Between Oct 2015 and Sept 2016 three meetings were held or to be held on dates as listed below dates:-

- 27th October 2015
- 24th May 2016
- 14th October 2016

1.3 WORKING COMMITTEES MEETING

UNESCO-IHP Malaysia plans its activities through its Committee and they are carried out by the three standing committees which are:

1. Committee on Research under the chairmanship of the Director of Humid Tropics Centre, Kuala Lumpur (HTC KL) and vice-chaired by National Hydraulic Research Institute of Malaysia (NAHRIM);
2. Committee on Education, Training and Public Information headed by the University Science Malaysia (USM) and vice-chaired by Universiti Teknologi MARA Malaysia (UITM); and

3. Committee on Standardization of Hydrological Practices headed by the Department of Irrigation and Drainage Malaysia (DID) and vice chaired by Univesiti Tenaga Nasional Malaysia (UNITEN).

2.0 ACTIVITIES UNDER IHP – VIII (2014 - 2021)

Most MIHP are aligned towards IHP-VIII activities and selected related activities for 2015-2016 sessions are as follows:-

2.1 THEME 1 : WATER-RELATED DISASTER AND HYDROLOGICAL CHANGE

(i) Name of programme : National Flood Forecasting and Warning System (NaFFWS)

Malaysia topography especially in Peninsular Malaysia had flat and generally low-lying coastal plains and is subjected to frequent severe flooding. The flooding which normally occurs during the northeast monsoons is both widespread and frequent. Serious flooding problems have to a certain extent dampened full development of Kelantan, Terengganu and Pahang total socio-economic potentials. In line with Integrated Flood Management (IFM) concept, both structural and non-structural measures are needed to manage flood risks. Structural measures has been designed in place to mitigate flood, while non-structural measures are used to support sustainable development plan and to reduce damages and losses of life during floods. DID have taken this initiative to develop the National Flood Forecasting and Warning System (NaFFWS) mainly to increase preparedness in managing flood. The objectives are to provide a 7 days flood forecast, 2 days advice warning to National Disaster Management Agency (NADMA) for the whole Kelantan River Basin, Terengganu River Basin and Pahang River Basin

and at designated forecast area with minimum or less than $\pm 0.5\text{m}$ difference between observed and forecasted flood level and generate a flood hazard map based on forecast result.

The duration for NaFFWS development is 18 months from January 2016.

2.2 THEME 3 : ADDRESSING WATER SCARCITY AND QUALITY

(i) Name of programme : National Water Balance Management System (NAWABS)

A comprehensive plan for the assessment and management of water resources across Malaysia is required to ensure that water resources are managed in a holistic and sustainable manner, so as to ensure the continued provision of water in the face of increasing water demand and growing concern regarding the future reliability of water supplies.

Improving the security and sustainability of water resources, as outlined in the Strategic Action Plan of National Water Resources Policy (2012), is seen by the Federal Government as a key driver to ensuring continued sustainable socio-economic development in the nation. The development of the National Water Balance Management System (NAWABS) is to fulfill the key areas identified in the Strategic Action Plan of National Water Resources Policy, 2012 (From Thrust 1 to Thrust 6, and Thrust 9). These strategic action plans shall satisfy the water resources security and water resources sustainability elements within the basin.

NAWABS will form as a project known as Projek Pembangunan Water Balance bagi Pengurusan Sumber Air Negara (Fasa 1). NAWABS once developed, shall assist and support Department of Irrigation and Drainage

and Water Resources Manager to manage their water resources in the river basin more efficiently through an updated and state-of-the-art operational management and planning tools. The development of NAWABS for the Muda River Basin will also include the development of a Decision Management Support System (DMSS). The Mike HydroBasin, Mike She and Mike Customised will be used for NAWABS development system.

NAWABS' Objectives

The development of NAWABS for the Muda River Basin is to fulfill the key core areas under the Strategic Action Plan of National Water Resources Policy, 2012 and the Integrated Water Resources Management under the management tools. Thus the objectives of the project are as follows:-

- To provide information on water resources :
Forecasting - 2 months in advance while
Advice warning to NADMA - 2 weeks in advance;
- Develop water accounting up to 2050, including effects of future climate change and accounting for possible water development projects.
- Quantify current and future demand for water resources taking into account population growth and planned agricultural and industrial development.
- Develop a comprehensive Water Resource Conservation Plan (WRCP) for Muda River Basin based on the above findings.
- Develop a DMSS consistent with the WRCP, utilizing the models developed above and findings from the water availability assessment. The DMSS will form part of the National Water Balance and Management System (NAWABS). Further to that the DMSS will have the capacity to provide decision management support to river

operators in the short to medium term (forecast horizon of one-year), as well as to provide a platform for undertaking and assessing longer term basin development scenarios (forecast horizon to 2050).

- Develop the capacity building among the DID staff especially on-job-training.

Water resources information are as follows :

1. Water Accounting System
2. Water Availability System
3. Water Demand Options system
4. Water Prioritisation and demand management options
5. Water Allocation System
6. Water Quality System
7. Water Storing and releasing during high and low flows
8. Water Resources Index (WRI) and Drought Index (DI)
9. Water Auditing System

The duration for NAWABS development is 24 months from 1.9.2016.

(ii) Overview study on Water, Energy and Food Nexus for Malaysia

Objective

The objective of this study is to identify a preliminary assessment of the status and challenges of water security, energy security and food security in Malaysia from the security parameters of availability, accessibility, affordability, quality, efficiency and sustainability

Scope of work

- This study offers a predominantly qualitative analysis of the Nexus challenge of water security, energy security and food security in Malaysia.
- Focus on nexus elements for Bernam, Perak and Kelantan River basin

Recommendation From WFE Nexus Study

- Deepen understanding of ‘internal’ and ‘external’ water-energy-food nexus
- Encode the design principles in Water Resource Law or State Enactments that encourage and support initiative across water-energy-food nexus
- Prioritise on water stress area, and conduct modelling of the interlinkages
- Create a platform and mechanism to break down silos
- Decentralise decision-making for to govern discharge level
- Institutionalise a long-term view
- Review and enforce existing environmental legislation to control river pollution

2.3 THEME 6 : WATER EDUCATION, KEY FOR WATER SECURITY

MIHP and DID Malaysia organise several program to increase capacity building and awareness of water resources as follows including:

- (i) IWRM Training Course held on 5 – 6 April 2016 at IPMI Kelantan
- (ii) Water-Energy-Food Nexus Course held on 7 – 8 September 2016 at IPMI Perak

(iii) National World Water Day 2016 celebration with theme of “Water and Jobs” held in Putrajaya, Malaysia . The launching ceremony and national exhibition in conjunction with World Water day 2016 held in Putrajaya (24th Mac 2016) at Water Sport Complex, Putrajaya



(iv) Universities Student Dialog on Water Resources at Universiti Kebangsaan Malaysia held on 31 March 2016



(v) Water Resources Forum - The Importance Of Water Resources From The Angle Various Religion was held on 29th May 2016. 4 panels representing Islam, Christianity, Hinduism and Buddhism.



(vi) Seminar on National Water Resources Policy Related to Sustainable Development Goals (SDGs) on 27 – 28 September 2016 at Puteri Resort Melaka.



(vii) Water Watch Programme for Young Leaders (WW4YL)

- WW4YL (South Zone) on 1 – 3 November 2015 at University of Technology Malaysia
- WW4YL (Central Zone) on 22 – 24 March 2016 at Perbadanan Putrajaya, Putrajaya
- WW4YL (North Zone) on 2 – 3 August 2016 at University of Sciences Malaysia, Penang
- WW4YL (Special for Unabled Student) will be on 26 -27 October 2016, Kuala Lumpur



- (viii) Seminar On Water Resources Security In The Context Of Sustainable Development Goals held on 25 May 2016 at Putrajaya



- (ix) Technical Talk

Between the periods of October 2015 to October 2016 Malaysia IHP held two technical talk and one training course sessions. The details of the technical talk session and training course sessions are as follows:-

- (a) 9 December 2015

- "Islamic Perspective On Water Security In The Muslim World: Towards Sustainable Developments" by International Institute of Advances Islamic Studies (IAIS) Malaysia.
- "Water Quality Improvement and Pollution Control : The Way Forward in Implementing TMDL in Malaysia" by Dr. Zaki Zainuddin, Water Quality Specialist

(b) 10 May 2016

- " Excessive Use Of Water By Oil Palm – Myth Or Reality? " by Dr. Norhayati Abdullah (University of Technology Malaysia)
- "Cloud Seeding – Way Foward To Climate Resilience “ By Malaysian Metrwoological Department



3 ACTIVITY AT REGIONAL / NATIONAL LEVEL IN THE FRAMEWORK OF THE IHP

3.1 Regional Level

(a) Participation in IHP Steering Committees/Working Groups

- Participation of IHP Malaysia in the 23rd Regional Steering Committee Meeting for Southeast Asia and the Pacific - UNESCO IHP, which was held in Medan, Indonesia on 19 – 22 October 2016.
- The 3rd Asia Pacific Biosphere Reserves at Bali Indonesia\MIHP - The 3rd Asia Pacific Biosphere Reserves was held at Bali Indonesia on 22 July 2016. MIHP was represented by Dato' Ir. Mohd Abdul Nassir bin Bidin, Deputy Chairperson of UNESCO IHP Malaysia.

3.2 National Level

(a) National/local scientific and technical meetings

At the national level, MIHP was invited to joint in several committees and key meeting including :-

- MIHP attended the Standing Committees of Science Meetings (under Ministry of Science, Technology & Innovation) as a member of the committee.
- MIHP attended relevant meetings chaired by the Malaysia National Commission on UNESCO

(b) UNESCO Malaysia Day 2016

UNESCO Malaysia Day 2016 was held at Putrajaya on 28th May 2016. Dr. Shahbaz Khan, Officer-in-Charge of UNESCO Jakarta also attend during UNESCO Malaysia Day 2016



4 PUBLICATIONS

- Monthly Updates of IHP activities in DID Bulletin
- Module for National Water Watch Programme for Young Leader by Committee on Education, Training and Public Information, IHP Malaysia
- Awareness Posters and Facebook of UNESCO-IHP Malaysia

JPS Updates (Ogos 2016)

KEM PEMIMPIN MUDA PRIHATIN AIR UNESCO IHP MALAYSIA KEBANGSAAN 2016 ZON UTARA
Mencetus Fenomena

Doleh - Bahagian Sumber Air dan Hidrologi

Kem Pemimpin Muda Prihatin Air UNESCO-IHP Malaysia Kebangsaan (ZON UTARA) telah diadakan dengan jayanya serentak dengan Bengkel Komuniti 'Saya Prihatin Air' di SMK Pauh Jaya pada 2-3 Ogos 2016. Program ini telah disertai seramai 100 orang terdiri daripada pelajar sekolah menengah, ibu bapa, para guru dan rakan agensi.

Objektif utama program ini adalah untuk menjelaskan dan meningkatkan pemahaman terhadap peranan pengurusan sumber air serta menyokong pelaksanaan Fokus Utama Dasar Sumber Air Negara (DSAN) bagi pembinaan keupayaan dan kesedaran dalam mempertingkatkan kefahaman dan kesedaran terhadap kepentingan jaminan dan kelestarian Sumber Air Negara.

Program ini meliputi dua aspek utama;

- Diseminasi maklumat tentang sumber air dan kepentingannya (teori),
- Apikasi praktikal tentang kaedah-kaedah mudah dan murah yang boleh digunakan oleh peserta di premis kediaman, sekolah atau tempat kerja masing-masing seperti cara membaiki paip.

Para peserta bengkel ini secara tidak langsung merupakan Duta Air UNESCO-IHP MALAYSIA dan mereka ini diharapkan dapat melakukan perubahan minda, sikap dan kefahaman serta dapat meningkatkan keprihatinan tentang isu, cabaran dan peluang dalam sumber air negara kita.




5 RESEARCH/APPLIED PROJECTS SUPPORTED OR SPONSORED

(i) Collaboration with other national and international organizations and/or programmes

- UNESCO Jakarta Office
- Malaysian National Commission for UNESCO (SKUM)
- Humid Tropics Center Malaysia (HTC)
- University of Science Malaysia (USM)
- National Hydraulic Research Institute Malaysia (NAHRIM)
- Universiti Tenaga Nasional Malaysia (UNITEN)
- Universiti Teknologi MARA (UITM)
- National Oceanography Department
- Putrajaya Corporation (PPJ)
- University of Technology Malaysia (UTM)
- University of Malaysia Sarawak (UNIMAS)

(ii) Cooperation with the UNESCO-IHE Institute for Water Education and/or international/regional water centres under the auspices of UNESCO

A number of Malaysian students are currently pursuing post-graduate studies at master's and PhD levels at this institute.

6 FUTURE ACTIVITIES

6.1 Activities planned until December 2016

- National Water Watch Programme For Young Leaders
- IHP Technical Talk
- Participation of IHP Malaysia in the 23rd Regional Steering Committee Meeting for Southeast Asia and the Pacific - UNESCO IHP
- Participation on exhibition on Malaysia Water Resources Management (MYWRM) Forum

6.2 Activities foreseen for 2017 - 2018

- Participation in IHP-RSC meeting Asian Pacific FRIEND and Catalogue of Rivers
- Cooperation between Malaysia Universities and Non-Governmental Organisation (NGOs) with IHP Malaysia on several matters for capacity building in hydrology and water resources fields
- Participation in IHP-Training course
- Implementation of projects related to IHP-VIII (2014 – 2021)

6.3 Activities envisaged in the long term

- Long-term cooperation between The Regional Centre of Expertise on Education for Sustainable Development (RCEs) Penang and IHP Malaysia for Regional Sejahtera ESD Network (RSEN) and other activities
- Malaysia National committee for IHP will promote activities to public coordinate participations at national level to augment people's

awareness through, educations and trainings on hazards caused by global warming, as well as hazards caused by geological events, These include sea level rise, flood and drought hazard, debris control, tsunamis, water and food security, and access to save water. Area of priorities is mega cities, and coastal areas.

- Participation in IHP-VIII projects and RSC activities.
- Information dissemination through a web page of the National Committee.
- Participation in IHP-RSC activities and IHP Inter-Governmental Council meetings in Paris.
- Malaysia IHP commitment to IHP Phase VIII (2014-2021)
- Scientific Researches by Malaysia IHP Standing Committee
- Collaboration with many other agencies for the purpose of scientific researches and public outreach programmes.

Other IHP Partners Members

Ministry of Treasury Malaysia
Ministry of Agriculture Malaysia
Ministry of High Education Malaysia
Ministry of Health Malaysia

Department of Environment Malaysia
Department of Forestry Malaysia
Department of Metrology Malaysia
Department of Ministry Malaysia
Department of Water Supply
Local Government Department
Mineral & Geoscience Department Malaysia

Nuclear Agency Malaysia
Malaysia Remote Sensing Agency (MACRES)
Forest Research Institute Malaysia
National Security Council, Malaysia

FELDA Agriculture Services Sdn. Bhd
FELCRA Berhad
Tenaga Nasional Berhad

Universiti Malaysia Perlis (UniMAP)
Universiti Teknologi Malaysia
Universiti Kebangsaan Malaysia
Universiti Tun Hussein Onn Malaysia
Universiti Teknologi MARA
Universiti Malaya
Universiti Putra Malaysia
Universiti Sains Malaysia
Universiti Pendidikan Sultan Idris
Universiti Malaysia Terengganu
Universiti Malaysia Pahang
Universiti Malaysia Sarawak

CONTACT US

1.	Chairman	<p>Y. Bhg Dato' Ir Zulkefli bin Hassan Director-General Department of Irrigation and Drainage Malaysia Jalan Sultan Salahuddin 50626 Kuala Lumpur Malaysia Tel : 60-3-2616 1504 Fax: 60-3-2697 2484 Email: zulkeflihassan.water@1govuc.gov.my</p>
2.	Deputy Chairperson	<p>TBA</p>
3.	Secretariat	<p>Ir. Ab. Qahar bin Osman Director Director for Water Resource Management and Hydrology Division Department of Irrigation and Drainage Malaysia KM 7, Jalan Ampang 68000 Ampang Kuala Lumpur Tel: +603 4289 5500 Fax: +603 4256 4037 Email: ab.qahar@water.gov.my</p>
4.	Deputy Secretary	<p>Ir. Hj. Mohd Razali bin Hussain Deputy Director Division of Water Resources and Hydrology Department of Irrigation and Drainage Malaysia KM 7, Jalan Ampang 68000 Ampang Kuala Lumpur Tel: +603 4289 5507 Mobile: +6019 600 3898 Fax: +603 4256 4037 Email: mrazali@water.gov.my</p>
5	Secretariat Office	<p>UNESCO-IHP Malaysia Water Resources Management and Hydrology Department of Irrigation and Drainage Malaysia KM 7 Jalan Ampang 68000 Ampang Kuala Lumpur, MALAYSIA</p> <p>E-mail : ihp@water.gov.my Tel : +603 4289 5566 Fax : +603 4260 1289 Facebook : UNESCO-IHP Malaysia</p>



United Nations
Educational, Scientific and
Cultural Organization



International
Hydrological
Programme

24th International Hydrology Programme, Regional Steering
Committee Meeting
for Southeast Asia and the Pacific
Ulaanbaatar, Mongolia, 23-26 October 2016

Activity report of the Mongolian National IHP Committee

Dr, prof. G. Nyamdavaa, Chairperson, Mongolian IHP National Committee and Director,
Land Management, Integrated Water Resources Policy and Regulation Department, MET

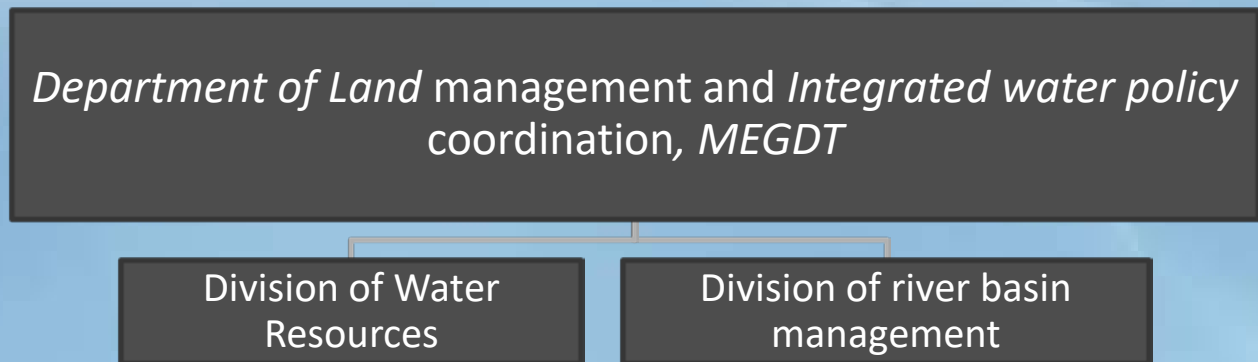
CONTENT

1. Introduction of the Mongolian National IHP Committee.
Activities 2015 – 2016
2. Plan of the Mongolian National Committee for IHP
3. Conclusion

Mr. G. Nyamdavaa, Chairperson, Mongolian IHP National Committee and Director, Land Management,
Integrated Water Resources Policy and Regulation Department, MET

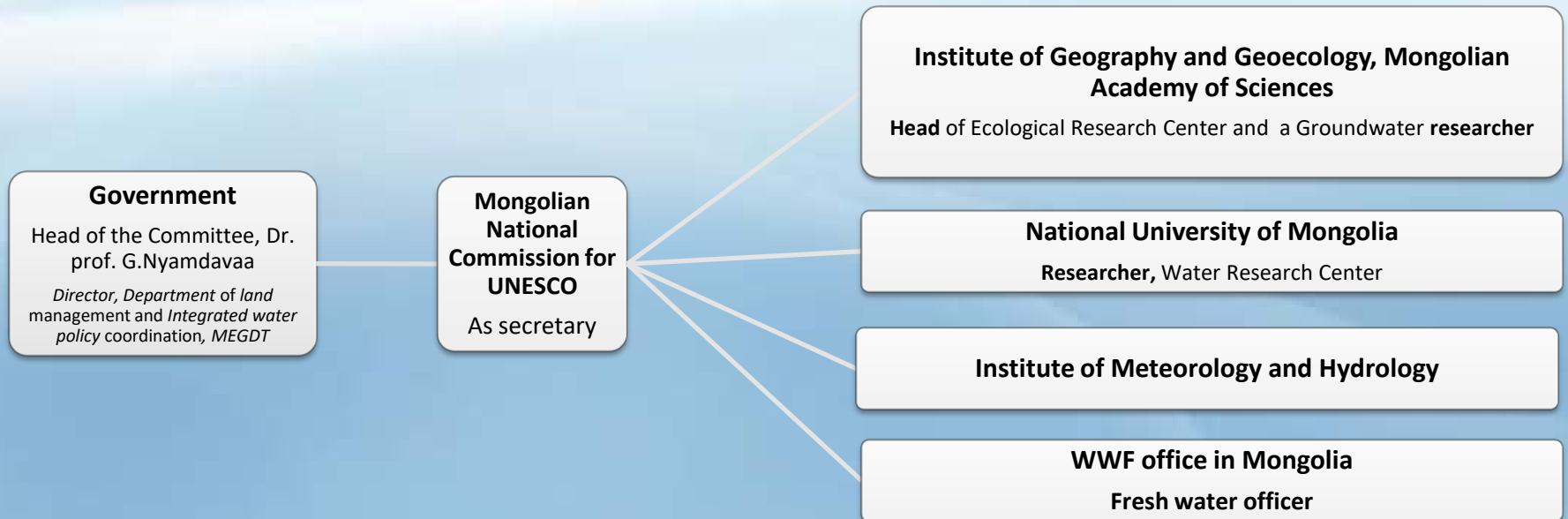
The Mongolian National IHP Committee

- Due to changes in the Government of Mongolia, IHP National Committee is renewed in September 2013 and also in November 2015.
- The Chair of the Mongolian National IHP Committee is the Director of the *Department of Land management and Integrated water policy* coordination, Ministry of Environment and Tourism (*MET*).
- Water policy of Mongolia is led and ruled by our department. The department consists of 2 divisions, which is responsible for water policy and regulations:



The Mongolian National IHP Committee

The Committee **consists of** researchers, scientists and specialists from the following institutions **with the aim to involve different groups** in the activities of IHP.





United Nations
Educational, Scientific and
Cultural Organization



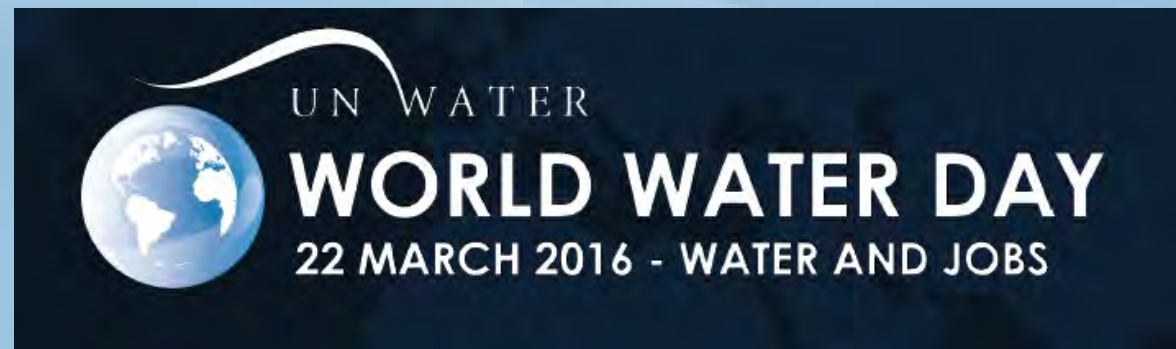
International
Hydrological
Programme

ACTIVITIES 2015-2016



Activities

- Celebration of the World Water Day every year
- Translated and broadcasted by media the messages sent by Ms. Irina Bokova, the Director-General of UNESCO, on the occasion of World Water Day



On the occasion to the WWD 2015:

- A Students' Scientific Conference under the theme "Water and Sustainable Development" was organized in cooperation the Ministry of Environment and Tourism, National University of Mongolia with aim to raise the awareness of students on the linkage between the rational usage of water, biodiversity and sustainable development.
- About 120 students from 10 Mongolian universities have participated in the conference.

Activities

On the occasion to the World Water Day 2016:

- A students' scientific conference under the theme “Water is a core of development” was organized in cooperation with the MET and the National University of Mongolia.
- 46 students of 18 public and private universities submitted presentations and 10 of them were selected to the second stage by the decision of the referee team. Total of 150 students participated in the conference.
- Selected presentations of the conference has been compiled and published.





Participants of the Student's Conference on the World Water Day 2016





International collaboration

In collaboration with the the U.S. Army Corps of Engineers, Ministry of Environment and Tourism (MET) and Fresh Water Institute (FWI) the following serial training workshops on IWRM have been organized in 2015-2016 in Ulaanbaatar, Mongolia:

- “Groundwater model building using mudflow for the Tuul river basin” Phase I Workshop in April 2015
- “Groundwater Modeling“ Phase II Workshop in September 2015
- “Tuul Groundwater Model Delivery Workshop” in September 2016

The workshops gathered water resource experts and people with a hydrology background, who work in the Water sector of Mongolia. These workshops enabled the participants to perform hydrologic analyses in support of Dam Safety studies, to improve existing hydrogeology technical capacity using the SVP model and the United States Geological Survey MODFLOW model for the Tuul River Basin groundwater resource.



United Nations
Educational, Scientific and
Cultural Organization



International
Hydrological
Programme

International collaboration



Lecturers and participants of the training workshops



Activities 2015 – 2016: 23th IHP RSC in Medan

- A representative of the Mongolian National IHP Committee participated in the 23th IHP RSC meeting for SEAP in Medan, Indonesia on 19-20 October, 2015.
- The decision to organize the 24th IHP RSC meeting in Mongolia was made at the meeting.

Ongoing activities

- The translation of the Strategic Plan of the 8th phase of IHP (IHP-VIII, 2014-2021) from English into Mongolian is in process. After translation it will be published.
- To include certain parts of the Strategic Plan of the 8th phase of IHP into the National action plan, which are suitable to Mongolian climate and water situation, and so to increase the possibility to implement the IHP strategy at the national level.
- To intensify the cooperation between UNESCO and the Government of Mongolia



MoU between UNESCO and Mongolia (Drafting)

“Increase Mongolia's involvement in UNESCO's International Hydrological Programme (IHP), enhancing sustainable use of water resources, human resource capacity, public awareness and water education.”

“Strengthen assessment, analysis, and monitoring surface and groundwater, continue on-going collaboration with UNESCO on integrated water resources management, water and sanitation, transboundary water resources, water quality, water pollution and climate change adaptation.”



Joint statement on the future cooperation

- The meeting is a great opportunity to strengthen the cooperation between UNESCO and the RSC members
- intensification of the cooperation between all of us to solve the water related problems and to contribute to the SDG 6 (clean water and sanitation)
- close collaboration to develop and carry out joint projects and events



Thank you for your attention.

NATIONAL REPORT ON IHP RELATED ACTIVITIES

MYANMAR

1. ACTIVITIES UNDERTAKEN IN THE PERIOD November 2015 – October 2016

1.1 Meeting of the IHP National Committee

1.1.1 Decision regarding the composition of the IHP National Committee

The Myanmar National Committee for IHP (MNC-IHP) has been organized on 24 March 2003 comprising a Chairman, a Vice Chairman, a Secretary and (17) members from 8 Ministries and 2 City Development Committees.

Under MNC-IHP, the (5) Working Committees (WC) were organized according to the (5) Themes of IHP-VI. Each working committees consists of (10) members from the members of departments and committees. Activities related to the themes of IHP-VII are implemented by the members of the working committees.

1.1.2 Status of IHP- VIII Activities

- Monitoring Water Quality of Rivers in Myanmar
- Monitoring the changes of Water resources in Myanmar
- Monitoring the low flow characteristics
- Assessment of the climate change impact on the flood events
- Developing the flood hazard map in order to reduce loss of lives and properties due to flood disaster
- Implementing the hydrological disaster risk management activities by using GIS and Remote Sensing Technologies

1.2 Activities at National Level in the framework of the IHP

1.2.1 National/local scientific and technical meetings

- Workshop for Policy Dialogue on the new Climate Change Projections for Myanmar organized by DMH, MCCAlliance and RIMES was held on 13. 6. 2016 at NayPyiTaw.
- Stakeholders Workshop to Implement a Pilot Project on Impact-based Forecasting and Risk-based Warnings was held at NayPyiTaw on 28. 9. 2016 to 30. 9. 2016.

1.2.2 Participation in IHP steering committees/working groups

Participants from DMH attended the UNESCO-IHP 13th, 14th, 15th, 17th, 18th, 19th, 20th, 21st and 22nd Regional Steering Committee Meetings for Southeast Asia and Pacific during 2005 to 2015.

1.2.3 Research / applied projects supported or sponsored

1.2.4 Collaboration with other national and international organizations and / or programs

Myanmar is the member country of EANET (Acid Deposition Monitoring Network in East Asia) since 2005. So Myanmar collaborates with EANET's activities.

Myanmar is collaborating with ADPC and RIMES (Regional Integrated Multi-Hazard Warning System for Africa and Asia) in Hydrometeorology, Seismology and Climate Change sectors.

Training on ADB TM4: RRI Model was held at Nay Pyi Taw on 25th-28th, January, 2016 organized by ADB, ICHAM, CTI & DMH.

Follow-up Training on RRI Model and Storm Surge Model and Training on Flood Disaster Risk Assessment organized by DMH, Asian Development Bank (ADB), ICHARM and UNESCO was held on 30th, March, 2016 to 6, April, 2016 at NayPyiTaw.

Training on Flood Disaster Risk Assessment and Follow up Training on RRI Model was held on 30th, March, 2016 to 6th, April, 2016 at NayPyiTaw.

“Donor Coordination Conference: Improving the delivery of Weather, Climate and Hydrological Services in Myanmar” was held on 1st, January, 2016 to 2nd, January, 2016 at NayPyiTaw.

Training Workshop on Hydraulic Modeling Using HEC-RAS with HEC-GeoRAS and ArcGIS for Flood Inundation Mapping organized by DMH and ADPC was held on 30th, May, 2016 to 2nd, June, 2016 at NayPyiTaw.

DMH is participating in Ayeyarwady Integrated River Basin Management Project organized by World Bank.

1.2.5 Other Initiatives

- Developing the Flood Hazard Map for and Katha and Kalewa .
- Five Hydrometry Monitoring Systems were installed Phaang, Taungoo, Hinthada, Pegu and Shwekyin stations along major rivers in Lower Myanmar area in 2014 and 2015. Some stations will be installed Hydrometry Monitoring Systems in 2016 and 2017.

1.3 Educational and Training Courses

1.3.1 Contribution to IHP courses

- Training on Hydrological Grade I was held in October, 2016 at Yangon.
- Training on Hydrological Grade II is preparing to open in November, 2016 in Mandalay.

- Training on RS and GIS Basic Course has been held from 5th to 9th in October, 2015 in NayPyiTaw.

1.3.2 Organization of specific courses

-

1.3.3 Participation in IHP courses

-

1.4 Publication

-

1.5 Participation in International Scientific Meeting

1.5.1 Meeting hosted by the country

- Monsoon Forum was held in May 2016 at Nay Pyi Taw, Myanmar. This meeting was organized by RIMES and DMH. Regional level Monsoon Forums were held in Ayeyarwady, Mandalay Regions and Taunggyi township.
- Training of Hydraulic Modeling using HEC-RAS with HEC-GeoRAS and ArcGIS to produce flood hazard maps for Lower Chindwin basin. It was implemented with technical assistance of ADPC(Asian Disaster Preparedness Center)
- Final meeting of the ADB on TA 8456 Part II (Flood Management in Myanmar) organized by DMH, ADB and ICARM will be held on 18th, October, 2016 at NayPyiTaw

1.5.2 Participation in meetings abroad

The Secretary of MNC-IHP is a Permanent Representative of WMO and so she has contact and coordinate with WMO's activities.

- United Nations Climate Change Conference COP 21/ CMP 11, Paris, 23th. November. 2015 - 11st, December, 2015.
- Forty-Fourth Session of the Subsidiary Body for Implementation (SBI 44) and Subsidiary Body for Scientific and Technological Advice(SBSTA 44) as well as the first session of the Ad-hoc Working Group Paris Agreement(APA1), Bonn, 16th – 26th, May, 2016.
- 8th Meeting of the RIMES Council, Pathumthani, 1st – 2nd, July, 2016.
- China-Asean Meteorological Forum and 46th China Study Tour, Nanning, 11th - 16th, September, 2016.

- Meeting on the Promotion Strategy for the National Meteorological Advancement in Myanmar and the Korea Climate and Meteorological Industry Exhibition, Seoul, 11th-12nd, October, 2016.

1.6 Other activities at regional level

1.6.1 Institutional relation / cooperation

-

1.6.2 Completed and ongoing scientific projects

-

2. FUTURE ACTIVITIES

2.1 Activities planned until / December 2016

-

2.2 Activities foreseen for 2016-2017

- The MNC-IHP will try to implement the water related activities in line with the themes of IHP
- IHP national committee will continue to encourage scientific and technical symposia and workshops
- The members of MNC-IHP will attend the 26th Regional Steering Committee for Southeast Asia and the Pacific.
- The members of MNC-IHP will participate in the international and national activities of IHP.
- Hydrological Division will upgrade the flood early warning system and flood monitoring system.
- Remote Sensing and GIS Division will produce the flood risk maps and flood assessment maps in order to reduce the loss of life and properties.

NATIONAL REPORT ON IHP RELATED ACTIVITIES

PHILIPPINES

**24th Regional Steering Committee Meeting
UNESCO International Hydrological Programme
(UNESCO IHP)
for Southeast Asia and the Pacific
held at Ulaanbataar, Mongolia
24 November 2016**

OCTOBER 2016

**Philippine National Committee
for the
UNESCO International Hydrological Programme
Republic of the Philippines**

1. ACTIVITIES UNDERTAKEN IN THE PERIOD OCTOBER 2015- SEPTEMBER 2016

1.1 Meetings of the IHP National Committee

1.1.1 Decisions regarding the composition of the IHP National Committee

The institutional members of the Philippine National Committee for the UNESCO-IHP are agencies and organizations (public and private) which are mandated with, and are engaged in research, development and management activities in the water sector:

Bureau of Soils and Water Management (BSWM), Department of Agriculture (DA)
Bureau of Research and Standards (BRS), Department of Public Works and Highways (DPWH)
Environmental Management Bureau (EMB), Department of the Environment and Natural Resources (DENR)
Flood Control & Sabo Engineering Center (FCSEC), Department of Public Works and Highways (DPWH)
Laguna Lake Development Authority (LLDA)
Local Water Utilities Administration (LWUA)
LPA & Associates (private sector)
Metropolitan Waterworks and Sewerage System (MWSS)
Mines and Geoscience Bureau (MGB), Department of the Environment and Natural Resources (DENR)
National Economic and Development Authority (NEDA)
National Hydraulic Research Center, University of the Philippines (UP-NHRC)
National Irrigation Administration (NIA)
National Mapping and Resource Information Authority (NAMRIA)
National Power Corporation (NPC)
National Water Resources Board (NWRB)
Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), Department of Science and Technology (DOST)
Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD), Department of Science and Technology (DOST)
Philippine Water Partnership (PWP)
Mapua Institute of Technology, School of Civil Engineering, Manila
University of Santo Tomas (UST), Department of Civil Engineering (UST), Manila
University of the Philippines at Los Baños (UPLB), College of Engineering and Agro-Industrial Technology (UPLB-CEAT), Los Baños, Laguna
Ateneo De Manila University (ADMU) - Manila Observatory, Quezon City
Central Luzon State University (CLSU), Muñoz, Nueva Ecija
De La Salle University (DLSU), Department of Civil Engineering (DLSU), Manila
University of San Carlos (USC), Department of Civil Engineering & Water Resources Research Center (USC), Cebu City

Officers of the Philippine National Committee for UNESCO-IHP:

Chairman: Leonardo Q. Liongson (UP Diliman)
Treasurer: Lino P. Aldovino (LPA & Associates)
Secretariat: NHRC and PWP staff (on secondment)

Agency Lead Representatives:

Leonor Cleofas, MWSS
Virgilio Basa, NAMRIA
Antonio Morano, DPWH-BRS
Resito David, DPWH-FCSEC
Christopher Ilagan, MWCI
Lennie Santos-Borja, LLDA
Rodora Gamboa, PWP

Finance Sub-Committee members:

Leonor Cleofas, MWSS
Dolores Hipolito, DPWH-FCSEC
Ms. Lyn Almario, MWCI
Francisco Arellano, MWSI
Romualdo Beltran, NPC
Lino P. Aldovino, PNC-UNESCO-IHP Treasurer

Technical Sub-Committee members::

Guillermo Q. Tabios III, UP-NHRC & I.C.E.
Roberto S. Soriano, UP I.C.E.
Romualdo Beltran, NPC
Samuel Contreras, BSWM
Emiterio Hernandez, LLDA
Milo Landicho, NIA
Roy Badilla, PAGASA

Program Sub-Committee members::

Peter Paul Castro, UP- NHRC & I.C.E. Dept.
Maria Antonia Tanchuling, UP- En.E. Program
Susan Abano, NWRB
Margarette Bautista, PAGASA
Isidora Camaya, NIA
Efren Carandang, NAMRIA
Maristel Espiritu, LLDA
George Estioko, NWRB
Myrna Lansangam, LWUA
Nicanor Mendoza, DENR-EMB
Jesusa Roque, NWRB
Teresita Sandoval, BSWM

Status of IHP activities

1.1 The Philippines Country Priorities has always been in response to the UNESCO-IHP Paris office as well as Jakarta Office. Since the

1.2 Activities at national level in the framework of the IHP

1.2.1 National/local scientific and technical meetings

Philippine Water Partnership (PWP),

- *Round table discussion on Updating the Philippine Water Code:* The activity under this Work Package is entitled “Updating of the 1976 Water Code of the Philippines and its Implementing Rules and Regulations (IRR)”. This program supports the National Government’s effort to update the Water Code, especially in the light of the major climate-induced calamities the country has been experiencing in more recent years. Series of discussions with the Project Team and stakeholders has been conducted in late 2015 and continued until mid-2016. Final revisions and discussions will be held before the end of 2016.
- *Incorporation of climate change provisions in existing national water policies:*
 - Final version of the draft bill has been prepared integrating all relevant comments generated from the multi-stakeholder consultations
 - Participation in the Experts’ Forum on the Proposed Amendments of the Water Code of the Philippines organized by the National Water Resources Board (NWRB)
 - Finalize the communication plan indicating strategies and champions identified to ensure that the proposed bill is in the priority agenda of Congress
 - Prepare a brief profile on the identified potential champions / endorsers
 - Identify and liaise with concerned committee at the House of Representatives (HOR) and Senate as potential Bill
- *Development of an investment checklist and priority programs of two (2) river basins:*
 - Capacity building on climate change for personnel of DENR-RBCO and members of the Board of River Basin Organizations (RBOs) to enable them to actively take part in the preparation and review of the river basin master plans.
 - Identify potential climate change related infrastructure in the masterplan.
 - Develop / prepare concept note for the planned regional workshop / consultation on the development of investment checklist.
- *Plan Activities for 2017:*
 - Strategic Goal 1 - Catalyze change in policy and practice
 - Outcome Challenge: CWP Incorporate water security in their IWRM and climate change-related policies and plans
 - Activity: Understanding Water and Food Nexus to Improve Water Security: The Philippine Context
 - Strategic Goal 2 - Generate and Communicate knowledge
 - Outcome Challenge: Stakeholders gain improved political awareness and commitment to deliver water security with demonstrable follow-up commitments and actions
 - Activity: Information, Education and Communication (IEC) campaign on water security

1.2.2 Participation in IHP Steering Committees/Working Groups

Country Representative, Attended 23rd Regional Steering Committee Meeting of the UNESCO International Hydrological Programme for Southeast Asia and Pacific (UNESCO-IHP SEAP) and the International Conference at Medan, Indonesia, October 2015.

1.2.3 Research/applied projects supported or sponsored

National Water Resources Board

Reservoir operations studies of Ambuklao, Binga and San Roque of the Upper Agno River Basin (January-November 2016): Involves optimization-simulation model development, optimization-simulation studies with 50 years historical data and with rescaled historical data under 2050 climate change scenario, and, finally development of reservoir operation rule curves based on these optimization-simulation studies.

Assessment and establishment of new streamflow monitoring system in the Upper Agno River and Angat River basin (2016-2017): Components of this project include sampling network design based on sampling error variance and capital and maintenance costs, and the establishment of new or revision of location of old stations based on the assessment of sampling network design.

University of the Philippines - Diliman, Institute of Civil Engineering (UP-ICE) and National Hydraulic Research Center (NHRC)

Coastal Protection and Seawall at Roxas Blvd. Manila Project with Department of Public Works (Dr. Eric Cruz, principal investigator): Components include (i) Planning and engineering of coastal flooding mitigation works of an airport runway in a storm-tracked island, (ii) Preliminary engineering of a sustainable beach pier along a typhoon-prone coast; (iii) Coastal development planning for tsunami exposure risk – theory and project applications; (iv) Preliminary engineering of a seawall against storm tides and waves along a built-up waterfront.

Review and Value Engineering of the Flood Risk Management Improvement Project of Cagayam de Oro River (Dr. Guillermo Q. Tabios III, principal investigator) July 2015-July 2016.: Project components include public consultations on alternative flood management plans, assessments of alternative flood mitigation plans through 2-d model simulations, presentation of flood simulations studies to stakeholders, finalize simulation and assessment studies after accommodating final concerns and issues of alternative flood mitigation plans and recommend flood mitigation plans to the decision maker (essentially the Department of Public Highways, Republic of the Philippines).

Bolinao Pangasinan Environment Study (Dr. Eugene Herrera, principal investigator): Component of this project include, (1) Study on Phosphorus as a Driver of Nitrogen Limitation and Sustained Eutrophication; (ii) Elucidation of sustained eutrophic conditions in the mariculture areas of Bolinao and Anda, Philippines using biogeochemical indices including oxygen isotope of phosphate,

Assessment Study of Water Quality and Pollution of Rivers in Northern Luzon (Dr. August Resurreccion, principal investigator, 2016): Assessments of Spatial and Seasonal Variation of Water Quality Parameters in Surface Water of Bued River and Identification of Mobility Indices and Assessment of Heavy Metal Contamination in Sediments nearby Small-Scale Mining Sites within Ambalanga River and the Ecological Risk Assessment of Heavy Metals in Soils, Water and River Sediments in and around Bued River.

University of the Philippines - Diliman, Department of Geodetic Engineering (UP-GE Dept) and Remote Sensing & Image Processing Laboratory

The DREAM Program (2011-2016) - The DREAM Program is a research and development project supported by DOST. It uses state-of-the-art technology in particular LiDAR to create high resolution up-to-date detailed maps of 17 major river basins. The DREAM Program is geared towards the generation of information related to floods and disasters as well as other applications of this detailed information for various industry sectors, government agencies, academe, and other stakeholders. The Workshop was a venue to understand the acquisition strategy, the characteristics of the data and prospects for research and science applications.

Department of Science and Technology (DOST) and University of the Philippines - Diliman (UPD).

Nationwide Operational Assessment of Hazards (Project NOAH)

Executive mission: to put in place a responsive program for:

- (a) Flood mitigation, specifically targeting a 6 hour flood early warning system for communities along 18 major river systems;
- (b) Improving communications for weather and other hazards

Activities:

- (a) Integrated Flood Early Warning System Rollout 2012
- (b) Airborne LIDAR survey: GPS, IMU, Laser Rangefinder
- (c) Precision watershed surveying for modeling of watersheds and flood zones
- (d) Accomplishments - Purchase, Inspection and Delivery of LiDAR Equipment, Training Lease of Aircrafts
- (e) Advanced Works
 - Establishment/Relocation of GCPs for base stations
 - At least two base stations are needed for LiDAR Survey
 - Reconnaissance and Preparation for LiDAR survey
 - Flood Plain Extent Delineation
 - Development of tools for DEM correction
 - Mobile Lidar Processing
 - Integration of Satellite, Terrestrial and Bathymetric Data
 - Automated 6-Hour prediction of Water Level in Montalban
 - Marikina Watershed Modeling
 - Rapid Flood Simulation for Flood Events

Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA),

Continuing Priority Programs of the Flood Forecasting Branch

- Upgrading of *Flood Forecasting Operations*.
- Establishment of *Communication Network Thru SMS Link* Between PAGASA Weather and Flood Forecasting Center (WFFC) Bldg. (Quezon City) and Magat Dam in Isabela.
- Calibration of the following hydrologic models, to be applied operationally to the various flood forecasting points of the Pampanga, Agno, Bicol and Cagayan River Basins:
MLRegression, Storage Function and Sacramento Model.

Establishment/Enhancement of *Community-based Early Warning System (CBEWS)* under the READY Project (UNDP), covering the following Provinces: Laguna, Ilocos Sur, Zambales, Cavite, Bohol

Conduct of *flood hazard mapping* (READY Project) in the following provinces: Ilocos Sur, Laguna, Cavite, Pampanga, Iloilo.

Improvement of the *Flood Forecasting and Warning System (FFWS)* of the Pampanga and Agno River Basins, to include the ff. activities:

Construction of the Pampanga River Flood Forecasting Center.

Implementation of JICA project in the Pampanga and Agno river basins

Strengthening of the *FFWS for Dam Operation*, including Magat Dam through the improvement of dam facilities and conduct of training.

Establishment of *Early Warning System for disaster mitigation* in the south (Iloilo) under the Korean Government - project began March 2008.

1.2.4 Collaboration with other national and international organizations and/or programmes

No additional information is available.

1.2.5 Other Initiatives

National Water Resources Board (NWRB)

Reforms in the Water Sector - Philippine Development Plan (2011-2016)

Strategy: Practice IWRM in the Water Sector,

- Whole Water Cycle Management and River Basin Approach

On-going Programs:

- Groundwater Resource Vulnerability

- Assessment using Isotope Techniques in Regions 2 and 10 (MGB/NWRB/PNRI- IAEA Funding)

- Inventory of water users in Region 2 -(IAEA)

- Groundwater Management Plan in Metro Iloilo including establishment of monitoring network (Government Funding)

- Preparation of Localized Customer Service Codes in CPC grantees

- Improvement of the water allocation system using Climate Change Impact Model intended for groundwater regulation that considers climate change scenarios

- Data collection and sampling of the groundwater data in Manila Bay Coastal Province (DENR-MBCO)

- Amendment of the Water Code (PD 1067) to be responsive to current issues and challenges and operationalize IWRM.

Proposed Programs:

- Establishment of an Integrated 3D GIS Based Water Resources Management Information System in the Provinces of Pampanga and

National Initiatives

- Legislative :Proposed Water Regulatory Commission and Water Reform Act

- Executive: Creation of a National Water Resources Management Office to address institutional fragmentation and improved science-based decision making.

Metropolitan Waterworks and Sewerage System (MWSS)

Water Supply Projects

- New Centennial Water Supply Project 2013 - 2017 Ppublic-Private Partnership (PPP)

Construction of a new water source in order to meet the increasing water demand. Also intended to provide a redundant dam for Metro Manila's domestic water supply.

- Bulacan BulkWater Supply Project 2014 -2017 PPP
Construction of water distribution system that will provide bulk water supply to the water districts of the Province of Bulacan
- 15 CMS Water Source Development Project 2014 -2017 PPP /Office of Development Assistance (ODA)

Department of Interior and Local Government (DILG)

Current Initiatives & Programs

- MDGF-Enhancing Access to & Provision of Water Services with the Active Participation of the Poor aims to enhance the provision of and access to water services in 36 waterless communities through a combination of improved policy environment and increases local capacities.
(a Joint Program of the Government and the United Nations, with funding from the Spanish government under the MDG Achievement Fund Strategies works with local governments and communities empowers the vulnerable and disadvantaged inspires commitment, support and partnerships)
- Sound Practices and Knowledge Products
 - Human rights-based approach to WATSAN development planning.
 - Godparent schne for knowledge and skills transfer
 - Localized customer service code for Level II systems
 - Fact sheets, Publications, Brochures
 - Local Water Governance Toolbox - Physical and Web-based Knowledge Products
- Sagana at Ligtas na Tubig sa Lahat Program- 455 Waterless Municipalities 2011-2016
Bottom-Up Planning & Budgeting Program 609 Focus Areas 2013-2016
- Sagana at Ligtas na Tubig sa Lahat Program (SALINTUBIG)
A pro-poor initiative designed to provide water supply systems for waterless municipalities and intend to enhance/improve local capacities of LGUs and Water Service Providers in planning, implementation and operation and management of water supply facilities in a sustainable manner;
Target Beneficiaries - 455 waterless municipalities, waterless barangays, resettlement / relocation sites, lying-in clinics, RHUs and BEMONCs
- Program Components
 - Capacity Development
 - Training and Workshops
 - Studies
 - OJT
 - Mentoring and Coaching
 - Infrastructure Investment
 - Construction
 - Rehabilitation
 - Expansion
 - Upgrading

National Irrigation Administration

- Construction of Balog-balog Single High Dam (650 MCM storage, 1.3 dam crest length with 20 CMS and 60 MW hydropower plant at 95% reliability).

Department of Public Works and Highways (DPWH)

Short-listed Structural Mitigation Measures

Pasig-Marikina River Improvement (RI) + Dam
Meycauayan RI
Malabon-Tullahan RI
South Parañaque – Las Piñas RI
East Mangahan Floodway (Cainta & Taytay RIs)
West Laguna Lakeshore Land Raising
Land Raising for Small Cities around Laguna Lakeshore
Improvement of the Inflow Rivers to Laguna Lake
Manila Core Area Drainage Improvement
West Mangahan Area Drainage Improvement
Valenzuela, Obando and Meycauayan (VOM) Improve.(to be studied further)

Proposed Non-Structural Measures

Strengthening of the Flood Information and Warning System (FIWS)
Effective Flood Control Operation and Warning System (EFCOS) improvement
New telemetric rainfall and water level gauging stations

Capacity Building for Strengthening Community-based FRM

Update and implement Information and Education Campaign (IEC) programs
Rainfall and water level monitoring by Barangay Disaster Risk Reduction and Management Councils (BDRRMCs)
Construction of evacuation routes and temporary evacuation centers

Improvement of Management Information System (MIS) for Disaster Risk Management

Improvement and development of MIS
Capacity building

Reforestation and Watershed Management

Fort Bonifacio Retarding Tank - a model urban rainwater catchment system.

Estero de Paco Development - dredging, riprap, slope protection and phytoremediation, facelifting of residential homes, walkway/linear park

National Sewerage and Septage Management Program (NSSMP)

Project Description -

Increase number of sewerage and septage management projects (outside Metro Manila) by 2020

Septage Management Targets

All LGUs have septage management programs serving their urban barangays

Capital costs per project range from P4-71 M

Sewerage Targets

17 HUCs outside of MM serving 50% of urban barangays; to be done in 2 phases of 25% each (interceptor type systems)

Capital costs average P410 million/project/phase

National Strategy

Facilitate a bottom-up, demand-driven project development process by providing local implementers with training, tools and financial incentives, including NG cost share for sewerage.

DPWH (in coordination with DOH) – conduct a high-impact nationwide training and promotion campaign

Integral component of the Sanitation Roadmap and National Sustainable Sanitation Plan, broader, over-arching frameworks (needed water and sanitation sector reforms are being developed by other groups)

Local Strategy

LGUs, water districts, and small water service providers use the NSSMP Guide for Local Implementers to develop projects

Projects will include operational guidelines, ordinances, enforcement, user fees, promotion campaigns

LGUs encouraged to share capital costs with WDs and/or bid out contracts to the private sector for septage collection and treatment

DENR regional offices continue to lead the creation of WQMAs and Funds

Flood Control & Sabo Engineering Center (FCSEC), Department of Public Works and Highways (DPWH), *Project for Enhancement of Capabilities in Flood Control and Sabo Engineering of the DPWH*, JICA.

Urban Resilient to Climate Change Projects

- Formulation of river basin flood mitigation master plans to flexibly cope with the potential impacts of future climate changes:
- structural measures resilient to climate change
- measures not to cause any casualties, even in the event exceeding the design flood
- Strengthen non-structural measures for climate change
- Strengthen monitoring system for rainfall intensities, river water level, tidal levels and other hydrological factors related to the climate changes
- Promotion of Rainwater Harvesting
- Retarding basins or ponds for flood control
- Rainwater collector systems in public school buildings for water supply and flood control
- Construction of Evacuation Centers

Bureau of Soils and Water Management (BSWM)

Bureau of Soils and Water Management (BSWM), *Drought Mitigation Measures*.

Bureau of Soils and Water Management (BSWM), *Integrated Watershed Management for Sustainable Soil and Water Resources Management of the Inabanga Watershed, Bohol Island, Philippines*.

Bureau of Soils and Water Management (BSWM), *Rainwater Harvesting*.

Bureau of Soils and Water Management (BSWM), *Rehabilitation/Upgrading of Regional and Provincial Soil and Water Analyses*.

Bureau of Soils and Water Management (BSWM), *Small Water Impounding Projects (SWIP)*.

Flood Control & Sabo Engineering Center (FCSEC), Department of Public Works and Highways (DPWH), *Project for Enhancement of Capabilities in Flood Control and Sabo Engineering of the DPWH*, JICA.

Laguna Lake Development Authority (LLDA), *Environmental User Fee Program* (as centerpiece of Environmental Management Program).

Laguna Lake Development Authority (LLDA), *River Rehabilitation Program* .

Laguna Lake Development Authority (LLDA), *Lake Fishery Management Program*.

Laguna Lake Development Authority (LLDA), *Laguna de Bay Shoreland Management*.

1.3 Educational and training courses

1.3.1 Contribution to IHP Courses

None

1.3.2 Organization of specific courses

None

1.3.3 Participation in IHP courses

Papers and Publications

None.

1.4 Participation in international scientific meeting

7th International Conference on Water Resources and Environment Research (ICWRER2016), Kyoto, Japan, June 6-9 2016

1.4.1 Meetings hosted by the country

International Conference on “Megacities, Water and Climate Change” hosted Waterlinks 2016 at Dusit Hotel, Makati City, October 5, 2016.

3rd International River Summit, "Megacities, Water and Climate Change ", to be hosted by the local government of Cagayan de Oro City, Philippines, 24-25 November 2016.

1.4.2 Participation in meetings abroad

No additional information is available.

1.5 Other activities at regional level

1.5.1 Institutional relations /co-operation

No complete information is available.

1.5.2 Completed and ongoing scientific projects

No additional information is available.

2.0 Future Activities

2.1 Activities planned for 2015-2016

Mapping of RSC Future Projects against IHP VIII "Water Security: Responses to Local, Regional and Global Challenges (2014-2021).

Participation in currently RSC-supported programs and activities such as APFRIEND, Catalogue of Rivers for SEAP, FFWS and the IHP training courses conducted by the Kyoto University.

Participation in the review of cross-cutting programs such as FRIEND, HELP and IWRM.

Evaluation by the national committee of the proposed IHP-VIII Themes, Focal Areas and Activities.

2.2 Activities in the long term

Concerted efforts and initiatives for research and extension activities in flood management, water-related multi-hazard risk assessment and mitigation, climate change mitigation and adaptation, and sustainable development in the context of integrated water resources management (IWRM).

Continued support of, and participation in the UNESCO-IHP in general and the RSC in particular, in all present and future: activities: APFRIEND (rainfall IDF and flood frequency studies), Catalogue of Rivers for SEAP, DRH, IHP training courses conducted by host countries, and joint hydrologic training courses and researches among member countries.



**NATIONAL REPORT ON IHP RELATED ACTIVITIES
IN REPUBLIC OF KOREA
In the period of NOVEMBER 2014 – OCTOBER 2016**

**Korean National Committee
for
The International Hydrological Programme
Republic of Korea**

Abstract

Since the beginning of the eighth phase of IHP, the Korean National Committee for the IHP(IHP-KNC) has been and being paid its efforts to achieve the objectives set by UNESCO for this phase of IHP and the key focal area's projects have been and being executed in Korean river basins and in the field of hydrology and water resources in Korea. Research projects supported by the Government in the framework of the IHP in the period of June 2014 – May 2016 have been executed according to the implementation plan of IHP-VIII phase.

Particularly, during this period, the IHP-KNC has been preparing the establishment of a UNESCO Category II Water Centre, the International Centre for Water Security and Sustainable Management(i-WSSM) at the K-water Institute, Republic of Korea which was unanimously endorsed in the 20th Session of the Intergovernmental Council of the IHP and approved by the General Conference in 2013.

The IHP-KNC will actively continue and participate in the Asian Pacific FRIEND/HELP projects to complete with successful results and also will execute a HELP river basin project in collaboration with other Asia Pacific HELP projects and UNESCO international cooperative studies. Furthermore, a series of international symposiums and workshops have been and will be organized during this period as the IHP-VII and - VIII activities of IHP-KNC and contributed to the 7th World Water Forum held in Daegu-Gyeongbuk, Republic of Korea in 2015.

1. ACTIVITIES UNDERTAKEN IN THE PERIOD NOVEMBER 2014 – OCTOBER 2016

1.1 Meetings of the IHP National Committee

1.1.1 Decisions Regarding the Composition of the IHP National Committee

Korea as a participant in the program, then appointed within its Ministry of Construction a IHD National Committee(later, IHP National committee), which undertook pioneer hydrologic surveys of selected representative basins in three major river systems during the program period, and embarked in 1975 on a 6-year International Hydrological Programme (IHP) project as the first step toward an extension of surveys of domestic river basins in order to fulfill its responsibilities in the world's consolidated efforts to cope with the water problem.

After the completion of the first phase of IHP in 1980, the second phase of IHP project(1981~1983), the third phase of IHP project(1984~1989), the fourth phase of IHP project(1990~1995), the fifth phase of IHP project(1996~2001), the sixth phase of IHP project(2002~2007), the seventh phase of IHP project(2008-2013) and eighth phase of IHP project(2014-2021) followed for the continuation of representative basin studies, the adoption of new techniques of water resources development and water quality control, the hydrological evaluation of urbanization and variations of watershed including sustainable development in a changing environment, hydrology and water resources development in a vulnerable environment, water interactions of systems at risk and social challenges and water dependencies of systems under stress and societal responses, and education and water security with responses to local, regional and global challenges.

From the beginning of the New Millennium through the year of 2010, the Korean National Committee for the IHP was reorganized and strengthened to fulfill the IHP activities more effectively and actively. Particularly, the Korean National Committee for the IHP has been reorganized to include more members from various water organizations in Korea under the supplement of the legal background in the beginning of 2011.

All members of the Committee were from every part of water related organizations in the country and executive functions are carried out within the Water Resources Bureau, Ministry of Land, Infrastructure and Transport.

Decisions regarding most of IHP related activities are made by this committee which is held regularly and on request in special occasion.

1.1.2 Status of IHP-VIII activities

As the completion of the seventh phase of IHP(2008-2013) the Korean National Committee for the IHP has executed most of the implementation plan of IHP-VII during the period(2008-2013), and initiated and undertook the core programme's Themes and Focal Areas from the beginning of the eighth phase of IHP(2014-2021) according to its implementation plan and projects.

During this period of the eighth phase of IHP, the Korean National Committee for the IHP has been paid its efforts to achieve the objectives set by UNESCO for this phase of IHP and the following projects have been and being executed in Korean river basins and in the field of hydrology and water resources in Korea;

- (1) Water related disasters and hydrological change
- (2) Groundwater in a changing environment
- (3) Addressing water scarcity and quality
- (4) Water and human settlements of the future
- (5) Ecohydrology, engineering harmony for a sustainable world
- (6) Water education, key for water security
- (7) FRIEND and HELP basin studies

1.2 Activities at national level in the framework of the IHP

1.2.1 National / local scientific and technical meetings

Annual regular or many special scientific and technical meetings in the framework of the IHP were held in collaboration with International Hydrologic Environmental Society(IHES), Korea Water Resources Association(KWRA), Korean Society of Civil Engineers(KSCE), ICOLD Korean National Committee (KNCOLD), IWRA Korea Geographic Committee(IWRA-KGC), Korea Federation of Water Science and Engineering Societies(KFWSES), Korea Water Resources Corporation(K-Water), and other water-related organizations in Korea. In those meetings, national/local hydrologic issues and water resources problems were dealt with special solution measures and their results were published in the form of scientific or technical reports and papers.

1.2.2 Participation in IHP Regional Steering Committees / Working Groups

- Republic of Korea was one of most active member countries in IHP Regional Steering Committee's activities for Southeast Asia and the Pacific.
- Republic of Korea's delegates actively participated in the IHP Regional Steering Committee, Workshop and Working Group meetings held in the period of 2014-2016.
- Republic of Korea IHP National Committee organized 21st IHP RSC Meeting of Southeast and the Pacific in Gyeongju, Republic of Korea.

1.2.3 Research / applied projects supported or sponsored

- Research projects supported by the Government in the framework of the IHP in the period of 2014~2016 have been executed according to the IHP Themes and Focal Areas.
- Some other research or applied projects were also supported or sponsored by the Government and other water-related organizations such as Korea Water

Resources Corporation(The K-water) during this period.

- The following projects have been and are being implemented for the Asia Pacific FRIEND in the representative river basins chosen as the Korean Asia Pacific FRIEND, and a Korean HELP basin(Kumho river) which is one of the International HELP basins;
 - Basic hydrologic analyses and data collection
 - Comparative regional flow regimes analyses
 - Rainfall models and design storm
 - Flood models and design flood
 - FRIEND river basins studies
 - Asia Pacific HELP(AP-HELP) river basin studies with UNESCO international joint cooperative studies

1.2.4 Collaboration with other national and international organizations / or programmes

The Korean National Committee for the IHP is functioning in the execution of IHP activities in collaboration with the following national and international organizations/or programmes; Korea Water Resources Corporation(K-Water); Korea Water Resources Association(KWRA); Korean Society of Civil Engineers(KSCE); Korean Society of Agricultural Engineers(KSAE); Korean Meteorological Society(KMS); ICOLD Korean National Committee(KNCOLD); IWRA Korean Geographic Committee; International Hydrologic Environmental Society(IHES); Korea Federation of Water Science and Engineering Societies(KFWSES); Korea Institute of Construction Technology(KICT); Korean Universities Hydrology and Water Resources Programmes.

1.3 Educational and training courses

1.3.1 Contribution to IHP courses

The Korean National Committee for the IHP is contributing to the Korean Universities hydrology and water resources courses in the framework of the IHP in which graduate students and engineers are mostly involved with IHP projects and also educated or trained through the formal courses.

1.3.2 Organization of specific courses

Special workshops and seminars in the field of hydrology and water resources are annually organized by the Korean National Committee for the IHP in collaboration with above mentioned organizations in 1.2.4. In these specific courses, special topics are dealt with practical application in river basins.

1.3.3 Participation in IHP courses

The Korean National Committee for the IHP has actively been participating in IHP courses which were held in Asia-Pacific regions such as Japan, China and Malaysia by sending highly qualified hydrologists or proper candidates.

1.4 Cooperation with the international /regional water centres under auspices

of UNESCO

- The Korean National Committee for the IHP has been preparing for the establishment of a UNESCO Category II Water Centre, the International Centre for Water Security and Sustainable Management(*i*-WSSM) at the K-water Institute, Republic of Korea which was unanimously endorsed by all member states in the 20th Session of the Intergovernmental Council of the IHP and approved by the General Conference in 2013.
- The Korean National Committee for the IHP has been collaborating very actively with other UNESCO Category II Centres such as ICHARM in Japan, Humid Tropic Centre in Malaysia and Asia Pacific Ecohydrology Centre in Indonesia.

1.5 Publications

- The Korean National Committee for the IHP is publishing IHP Annual Research Report in the form of Government Publication since 1975.
- These reports are distributed to all water-related organizations and IHP-KNC members and research results are published on the journals of academic societies or organizations.
- Some other technical reports, proceedings of scientific meetings and specific course's materials are also published by the IHP-KNC.

1.6 Participation in international scientific meetings

- Meetings hosted by the country

The following IHP meetings were hosted and organized by the IHP-KNC and IHES

- 2014 Nakdong River Water Week/International Water Forum(Na-Ri IWW/IWF 2014) and Daegu International Water Forum(DIWF) held between 20 – 23 October 2014, Gyeongju and Daegu, Republic of Korea.
 - In the 7th World Water Forum, the IHP-KNC arranged and contributed to more involvement of the IHP communities in processes and activities of the 7th World Water Forum which was held in Daegu-Gyeongbuk, Republic of Korea on 12-17 April, 2015.
- Participation in meetings abroad

The Korean National Committee for the IHP actively participated in the IHP Inter-Governmental Council meeting as well as the regional IHP meetings such as Meetings of IHP Regional Steering Committee for Southeast Asia and the Pacific, Asia Pacific FRIEND Project and its workshops, Asia Pacific HELP project and its workshops, working Group meetings and etc.

2. FUTURE ACTIVITIES

- IHP-KNC will actively continue and participate in the Asian Pacific FRIEND/HELP projects to complete with successful results for the Southeast Asia and the Pacific and also will execute a HELP river basin project in collaboration with other Asia Pacific HELP projects and UNESCO international cooperative studies.
- The following international symposiums and workshops have been and will be organized during 2014-2016 as the IHP -VIII activities of IHP-KNC.
 - Korean Workshops of AP-HELP during 2014-2016.
 - 7th WWF Related Meetings, Daegu Gyeongbuk in 2014 - 2015.
 - 2014 International Water Forum(Na-Ri IWW/IWF 2013 & 2014) Gyeongju and Daegu, Republic of Korea.
 - 2016 IHES International Workshop on AP HELP and Sustainable Water Management and Planning, Daegu, Republic of Korea.

NATIONAL REPORT ON IHP RELATED ACTIVITIES

THAILAND

for

**24th UNESCO IHP Regional Steering Committee Meeting
for Southeast Asia and the Pacific:
(UNESCO IHP RSC for SEAP)**

24-26 October 2016

Ulaanbaatar, Mongolia

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1 ACTIVITIES UNDERTAKEN IN THE PERIOD of November 2015 – October 2016

1.1 Meeting of the IHP National Committee

1.1.1 Decision regarding the composition of the IHP National Committee

The present composition of Thailand National Committee – IHP: TNC-IHP consists of 18 members as follows:

Chairman:	Director General of Department of Water Resources
Vice Chairmen:	Deputy Director General of Department of Water Resources Deputy Director General of Royal Irrigation Department
Secretary:	Director, Bureau of Research, Development and Hydrology Department of Water Resources
Members:	Representatives from concerned agencies and experts are as follows: <ol style="list-style-type: none">1. National Park, Wildlife and Plant Conservation Department2. Department of Groundwater Resources3. Royal Irrigation Department4. Thai Meteorological Department5. Marine Department6. Hydrographic Department, Royal Thai Navy7. National Research Council of Thailand8. Department of Royal Rainmaking and Agricultural Aviation9. Secretariat of the Thai National Commission for UNESCO10. Electricity Generating Authority of Thailand11. The Thailand Research Fund12. Thai Hydrologist Association13. Mr. Veeraphol Taesombat14. Director of Research and Hydrology Development Division, Bureau Research Development and Hydrology Department of Water Resources

The mailing address is as follows:

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1.1.2 Status of IHP-VIII activities

The activities related to IHP-VIII on water resources are undertaken through the strategies and implementation plans on water resources management focused on public participation in 25 river basins in Thailand.

1.1.3 Decisions regarding contribution to/participation in IHP-VIII

There was not the meeting of Thailand National Committee –IHP or any discussions in October 2015 – September 2016. However, the secretariat of TNC – IHP still encourages the members to continue on knowledge and technology sharing, and cooperate in various ways to promote hydrological improvement and water resources criteria.

1.2 Activities at national level in the framework of the IHP

1.2.1 National/local scientific and technical meetings

Thai representatives attended in various meetings particularly on hydrology, meteorology, flood forecasting and warning system, water resources and environmental management.

1.2.2 Participation in IHP Steering Committees/Working Groups

Representatives from TNC – IHP and the Department of Water Resources participated in the 23rd Regional Steering Committee Meeting for Southeast Asia and the Pacific, and the International Conference on Integrated Actions for Global Water and Environmental Sustainability, 19-22 October 2015, Medan, Indonesia.

1.2.3 Research/applied projects supported or sponsored

Research projects have implemented by concerned agencies of the Thai government for the fiscal year of 2015 (B.E.2558) according to the IHP VIII are as following:

Theme 1 Water Related Disasters and Hydrological Change

TNC - IHP has implemented various activities according to the Theme 1 as follows;

- Telemetry system installation for water monitoring.
- Development of capacity building models on community's adaptation for the rising risk of water resources from climate change and fluctuation in 2015-2016.
- Developing of perception from flood - landslide disaster and community preparedness behavior for mitigating the impact of disaster: Case study of flood-landslide risk areas in Southern region 2015-2016.
- Evaluating and monitoring surface water quality of community water resources in the area affected by flood of Nan River Basins in 2015-2016.
- Risk assessment and impact analysis of climate change on community water resources: A case study comparison of Chi and Mun river basins 2015-2016.
- Local utilization on water resources conservation and rehabilitation project in the areas of Water Resources Regional 3 Office, Department of Water Resources in 2015-2016.
- Developing of perception from flood - landslide disaster and community preparedness behavior for mitigation the impact of disaster: Case study of flood-landslide risk areas in southern region on 1 October 2015 - 30 September 2016.
- Development of capacity building models on community's adaptation for the rising risk of water resources from climate change and fluctuation on 1 October 2015 - 30 September 2016.
- Awareness of local community to the impact of climate change and adaptation.
- Climate change and its impacts on water resources management of community (Multiple case studies: tributaries of the Mun River basin)
- The effect of climate change on community based water management: Case study in the Mun River sub watershed area.
- Benefiting from global and local earth observation systems.

Theme 2 Groundwater in a Changing Environment

TNC - IHP has implemented various activities according to the Theme 2 as follows;

- Project implementation on groundwater and hydro-geological map by the Department of groundwater resources with financial support of Groundwater Development Fund
- Installation of telemetry system for water monitoring.
- Installation of simple water gauges with message boards for early warning to community.
- Roles of local administration on flood management in Pathumthani Province.
- Selection of the location for disaster victim center and assistance route for flood mitigation.
- Study on using lateritic by mixture of soil and cement for road restoration after flood.
- Market strategies of hotel business after the violent of flood in 2011; Case Study in PhraNakorn Sri Ayutthaya Province.
- Addressing strategies for management of aquifers recharge.
- Promoting management of trans-boundary aquifers.

Theme 3 Addressing Water Scarcity and Quality

TNC - IHP has implemented various activities according to the Theme 3 as follows;

- Improvement of Electricity Generating Authority of Thailand (EGAT) Reservoir Operation Rule Curve.
- Model Improvement for optimal reservoir operation in the Maeklong River Basin.
- Local wisdom on water resources management in the upper northeastern Mekong river basin.
- Study the efficiency on water resources management in paddy field due to the change of water storage in the Mun river basin, Phase III in Samrong District, Ubon Ratchathanee province.
- Study on sustainable water resources management in household according to the philosophy of sufficiency economy.
- Strategy review on water resources management for preparedness on climate change in Thailand.
- Water access and efficient water use according to the green economic concept to handle climate change in Suan Pheung district, Ratchaburi province.
- Strengthening of water user group.

Theme 4 Water and Human Settlements of the Future

TNC - IHP has implemented various activities according to the Theme 4 as follows;

- Study on format of expansion for production of drinking water with slowly sand filtration system in backcountry such as Omkoi and Mae Chaem districts in Chiang Mai province.
- System wide changes for integrated management approaches.
- Institution and leaderships for beneficitation and integration.

Theme 5 Eco-hydrology, Engineering Harmony for a Sustainable World

-

Theme 6 Water Education Key, for Water Security

TNC - IHP has implemented various activities according to the Theme 6 as follows;

- Enhancing tertiary water education and professional capabilities in the water sector
- Water education for children and youth
- Education for transboundary water cooperation and governance

1.2.4 Collaboration with other national and international organizations and/or programmes

- Collaborate with German Agency for International Cooperation: GIZ under the support by German Federal Ministry of Environment, Nature Conservation and Nuclear Safety (BMU) to contribute the project on Improved Flood and Drought Prevention through Ecosystem-Based Adaptation in Watershed for 3 years of implementation

-

1.2.5 Other initiatives

-

1.3 Educational and training courses

1.3.1 Contribution to IHP courses

None

1.3.2 Organization of specific courses

-

1.3.3 Participation in IHP courses

-

1.4 Cooperation with UNECSO-IHE Institute for Water Education and/or international/regional water center under the auspices of UNESCO

-

1.5 Publications

-

1.6 Participation in international scientific meeting

1.6.1 Meetings hosted by the country

-

1.6.2 Participation in meetings abroad

Representatives from Thailand participated in the meeting abroad as follows:

- Asian Water Cycle Initiative on “Asia Water Cycle Symposium: AWCS, 1-2 March 2016, Tokyo, Japan.
- The meeting of the Typhoon Committee on Annual Meeting of 48 (48 TC Session) Hawaii USA in March 2016.
- Regional Consultation Workshop on Discharge and Sediment Decentralization Batch 2 and Preparation for the New TORs to Continue the National Data Collection 2016-2017 on 2-4 April 2016, Vientiane, Lao PDR.
- The 1st Meeting of the Committee of the cyclone – The 43rd Session of WMO/ESCAP Panel on Tropical Cyclones, Annual Meeting of 43 (43 Panel of PTC) on 2-6 May 2016 in New Delhi India.
- The Working Session on National Indicative Plans "Monitoring and Evaluation System", Office of Secretariat in Vientiane (OSV) on 12 May 2016.
- The Workshop for Partner Staff on M&E and Measuring Change, 26-27 May 2016, Vientiane, Lao PDR.
- Cooperative Visit between the Ministry of Natural Resources and Environment of the Kingdom of Thailand and the Department of the Environment and Heritage of Australia, 10-16 July 2016, Australia.
- Regional Technical Workshop on the Council Study's Social and Economic Assessment Approach and Methodology, 26 August 2016, OSV, Vientiane, Lao PDR.
- Regional Dissemination Meeting on the National Indicative Plans 2016-2020, 1 September 2016, Phnom Penh, Cambodia.
- The meeting of the Typhoon Committee on Hydrology Group Meeting at 5 (5WGH) South Korea on 5- 8 September 2016.
- The field trip to Lancang River as part of the Joint Research between MRC – China and IWMI, 22 – 26 September 2016, China
- International Training Workshop on Watershed Management and Technology for Soil and Water Conservation, 9-15 October 2016, Beijing, China.

1.7 Other activities at regional level

1.7.1 Institutional relations /cooperation

TNC-IHP has remained coordination closely and contacts with UNESCO Jakarta Office and UNESCO Bangkok.

1.7.2 Completed and ongoing scientific projects

- Implementation of Joint-Discharge and Sediment Transport and Bed load Measurements in Mekong River in Thailand.
- Nam Pong project: Series of training for national modeler under IWRM principles.
- Lam Ta Kong project: Series on the job training/workshop for capacity building for the application of ArcSWAT.

2 FUTURE ACTIVITIES

2.1 Activities planned until December 2016

-

2.2 Activities foreseen for 2016-2017

- Continuation of Collaboration with RSC for Southeast Asia and the Pacific
- Enhancing activities contributed to IHP-VIII
- Enhancing activities on flood and drought management
- Continuation on promotion of integrated water resources management
- Expansion on implementation of integrated water resources management to the rest of the country
- Promotion on capacity building on water resources management for River Basin Committee
- Participate in the international forum/conference on water resources management or environmental aspects
- THA 2017 International Conference on Water Management and Climate Change towards Asia's Water Energy - Food Nexus on 25-27 January 2017 in Bangkok Thailand.

2.3 Activities envisaged in the long term

- Enhancing activities contributed to IHP-VIII
- Enhancing activities in Flood and Drought Management
- Highlight on Integrated Water Resources Management in 25 river basins
- Continuation of raising public awareness and education on water resources management
- Continuation of raising public participation on water resources management

*Thailand National Committee for IHP
Department of Water Resources
Ministry of Natural Resources and Environment
October 2016*

NATIONAL REPORT ON IHP RELATED ACTIVITIES

I. ACTIVITIES UNDERTAKEN IN THE PERIOD OCTOBER 2015 - OCTOBER 2016

1.1 Meetings in the IHP National Committee

1.1.1 Decisions regarding the composition of the IHP National Committee

The Committee has remained unchanged during the period under review, with the Chairman being Prof. Tran Thuc, Vietnam Institute of Meteorology, Hydrology and Climate Change - Ministry of Natural Resources and Environment.

Assoc. Prof. Dr. Hoang Minh Tuyen, secretary of IHP National Committee.

The current Vietnam National Committee for IHP (VN IHP) consists of water experts working in hydrology and water resources in Viet Nam. Experts from Institutes, Departments and Committees concerned are as follows:

1. Vietnam Institute of Meteorology Hydrology and Environment
2. Department of Water Resources Management.
3. National Hydro-Meteorological Service
4. Ha Noi University for Natural Resources and Environment
5. Ha Noi Water Resources University
6. Center for Water Resources Planning and Investigation

1.1.2 Status of IHP-VIII activities

Prepare for the participation/contribution to IHP-VIII activities.

1.1.3 Decisions regarding contribution to/participation in IHP-VIII

1.2 Activities at a national level in the framework of the IHP

1.2.1 National/local scientific and technical meetings

Scientific and technical meetings are generally held within the context of the Ministry of Natural Resources and Environment, Ministry of Science and Technology, and Professional Societies (particularly the Viet Nam Natural Resources and Environment, Viet Nam Fluid Mechanics, and Viet Nam Geography Societies).

The IHP National Committee has 2 meetings with the Vietnam National UNESCO Commission on the activities of the IHP National Committee. The

Chairman and the Secretary of the IHP National Committee meet regularly to discuss IHP matters.

1.2.2 Participation in IHP Steering Committees/Working groups

The members of the Viet Nam National Committee for the IHP have attended and participated actively in all of the annual meetings of the Regional Steering Committee.

On 18 March 2016, VN IHP and IMHEN organized the Consultation Workshop on Draft climate change scenarios and sea level rise for Vietnam, 2016 Version.



1.2.3 Research/applied projects supported or sponsored

- Co-operated with HRC to develop Flash Flood Warning System for Vietnam (VNFFGS), funded by VN Government
- Participated in developing Flash flood potential maps and Flash flood Warning System funded by VN Government.
- Participated in updating Climate change scenarios for Viet Nam in 2016 version, funded by VN Government
- Develop Potential Flood maps due to storm surge in strongest typhoons from Quang Ninh to Ninh Bình

1.2.4 Collaboration with other national and international organizations

1.2.5 Other initiatives

1.3 Education and training courses

24th IHP REGIONAL STEERING COMMITTEE MEETING FOR SOUTH EAST ASIA AND THE PACIFIC

Ulaanbaatar, Mongolia

(24 October 2016 – 25 October 2016)

NATIONAL REPORT OF NEW ZEALAND

1. Activities undertaken in the period October 2015– October 2016

1.1 Meetings of the IHP National Committee

1.1.1 Composition of the IHP National Committee

Mr. Dennis D Jamieson and MS Srinivasan have continued to maintain a watching brief of developments and act in the role of Chairman and Secretary respectively as per their previous formal roles in the IHP National Committee during the reporting period.

1.1.2 Status of IHP activities

The following projects continue to be funded:

- Information on New Zealand’s Freshwaters: Water Resources Archive;
- Land Use Intensification: Sustainable Management of Water Quality and Quantity;
- Reducing the Impacts of Weather Related Hazards;
- Information on New Zealand’s Freshwaters: Climate and Water Resources Archives is a national programme of climate and hydrometric data collection. The data produced from this programme are of increasing importance to guide decision-making on development (especially proposed hydropower and expanded irrigation) and to contribute to the assessment of effects of human related activities on rivers and lakes. In addition there is wide interest in the effects of climate change on water resources and consequent effects on hydropower and agriculture.

As reported in previous years, the implementing agency (National Institute of Water and Atmospheric Research - NIWA) continues a policy of “free” data access for most users although budget pressures resulting from reviews of government science make this approach difficult to sustain

1.1.3 Decisions regarding contribution to participation in IHP-VIII

Components of the New Zealand hydrological research programme have increasingly good alignment with IHP-VIII themes in eco-hydrology and IWRM. This is fostered by collaborative processes that

integrate social science and cultural perspectives into resource management with biophysical sciences. These approaches have been prominent in some regional councils regions in New Zealand (particularly Canterbury and Waikato), but are of increasing relevance to Central Government work.

1.2 Activities at national level in the framework of the IHP

1.2.1 National/local scientific and technical meetings

Core principles of IHP-VIII align with priorities for New Zealand. Central Government is responding to strong public and political pressure to improve water quality and flow regimes in rivers.

Scientific and technical meetings are generally held within the context of professional societies (particularly the New Zealand Hydrological Society) and resource management affairs (e.g. workshops to brief groups established to guide government decisions on future land and water use).

1.2.2 Participation in IHP Steering Committees Working Groups

New Zealand attended the 2015 RSC meeting enabled by sponsorship through UNESCO – Jakarta..

1.2.3 Research/applied projects supported or sponsored

None directly sponsored by IHP.

1.2.4 Collaboration with other national and international organizations and/or programmes

Republic of Korea Water Resources Association (KWRA) – collaborative research strategy with NZ Hydrological Society (NZHS)

The KWRA and NZHS have had a Memorandum Of Understanding (MOU) in place since 2007. Regular exchanges between the organisations continue.

Links with other International and Regional organisations

Regular contact is maintained with Charles Pearson, the Regional Hydrological Advisor to the President of the WMO Region V (Asia Pacific). Contact is also maintained with SOPAC's Suva based Water & Sanitation Unit, through its role of representing the SW Pacific Island states on water related issues.

1.2.5 Other initiatives

Ecohydrology and NZ government priorities for infrastructure

Application of Ecohydrology principles is evident as water infrastructure options are advanced in New Zealand. Two examples are on the Opihi and Hurunui Rivers (Canterbury) where and existing and possible infrastructure concepts are being refined through field studies. The approach of increasing rivers flows in rivers used for water sources is resulting in additional interest in infrastructure which will be required to achieve downstream flow regimes.

Update of New Zealand Flood design methods

The Central Government has just included the need for this in a report (October 2016) updating its National Infrastructure Plan. A series of meetings are being held to determine a work programme between central and local government that meets the needs of practitioners and policy makers. This initiative is aligned with the APFRIEND activities over a number of years.

Application of IHP-VIII approaches to urban water

There is increasing government interest in improving practices for “3 waters” (stormwater, wastewater and water supply). These interest align with concern from the NZ public, given the country is highly urbanized and there have been a series of high profile incidents. These include a major mass illness outbreak due to a contaminated urban water supply.

This change is significant as it indicates SDG topics are relevant and that the previous largely sole focus on “rural” water quality issues is changing. Investments in urban water infrastructure is far larger than in rural water infrastructure and public interest is more pronounced in urban water quality issues so this is a significant change. An important response to public concern has been increased coordination between the multiple infrastructure, policy, health etc. agencies involved and a realization that things need to change.

1.3 Educational and training courses

1.3.1 Contribution to IHP courses

None.

1.3.2 Organisation of specific courses

Courses and workshops run in New Zealand generally meet national needs. Because of the country's relative remoteness and distinctive resource management requirements, courses are not always suitable for participation by people from overseas.

National Institute of Water and Atmospheric Research (NIWA) Courses / workshops

Over the course of a year NIWA provides many courses for regional government agencies and their own staff. These cover many topics from general hydrological training to courses on specific topics of wide interest.

1.3.3 Participation in IHP courses

See 1.3.1.

1.4 Publications

Contributions to IHP publications have been principally through the Regional Steering Committee and the Asia-Pacific FRIEND. Other publications related to IHP activities include:

The "Climate Update" monthly bulletin

See <http://www.niwa.co.nz/climate/publications>

The "Island Climate Update" (ICU) monthly bulletin

The ICU, produced by NIWA's National Climate Centre in collaboration with SOPAC, is a multi-national project with important contributions from the meteorological services of countries around the region. The bulletin provides El Nino/Southern Oscillation and seasonal rainfall forecasts, discusses climate developments each month and provides a tropical rainfall outlook for the next three months and tropical cyclone outlooks during the cyclone season. It also includes an editorial on some topical aspect of relevance and interest to end-users.

<http://www.niwa.co.nz/climate/publications>

"Freshwater and estuaries update" bulletin

This is published to cover developments in the freshwater to estuaries zone. Estuaries are increasingly incorporated in joint programme given the direct connection to freshwater issues in NZ.

<http://www.niwa.co.nz/freshwater-and-estuaries/freshwater-and-estuaries-update>

1.5 Participation in international scientific meetings

1.5.1 Meetings hosted by the country

NZ Hydrological Society Annual Symposium

The annual conference of the New Zealand Hydrological Society 2015 was held in Hamilton NZ.

1.5.2 Participation in meetings abroad

A wide range of science conferences and events were attended. Alignment with IHP activities is a common theme of topics, given alignment with IHP-VIII.

1.6 Other activities at regional level

1.6.1 Institutional relations/co-operation

There is considerable contact between New Zealand and other UNESCO Member Countries in the Asia-Pacific region, especially with the Pacific Island countries. For example NIWA is working with agencies in many countries on updating hydrological information and database management systems. Many useful contacts have been enabled via the IHP, even though subsequent work has been in the context of bi-lateral arrangements and Pacific HYCOS.

1.6.2 Completed and ongoing scientific projects

Science programs are subject to ongoing change and reorganization. The “Science Challenge” programme in Land and Water sciences is being further rolled out. This is providing a framework for coordinated work amongst many institutions on effective work on f=diffuse pollution and required flow regimes..

2. Future Activities

2.1 Activities foreseen until December 2016

The annual conference of the NZ Hydrological Society is to be held at Queenstown New Zealand. The theme this year is “Water, Infrastructure and the Environment”." It is a major joint conference involving the New Zealand Hydrological Society, Engineers Australia’s National Committee on Water Engineering and the Institution of Professional Engineers NZ Rivers Group,

2.2 Activities planned for 2017

Generally scientific activities planned at the national level are within the context of the research programme funded by NZ government. A significant proportion of this activity will be in areas that are included within the IHP, but are not explicitly implemented as a component of the IHP.

NIWA Courses

A range of training courses will be offered by NIWA. For a full list of courses refer to the NIWA web site. These courses are also open to overseas participants.

2.3 Activities envisaged in the long term

Continuation of the:

- NZAID funded Pacific Hydrological Training Programmes as required;
- NZAID funded monthly “Island Climate Update” publication with stronger links to end users.
- Monthly NZ “Climate Update” and “Climate Outlook” (web) publications.
- Quarterly “Fresh Water and estuaries Update” (web) publication.

**24th Meeting of International Hydrological Program Regional
Steering Committee for the Southeast Asia and the Pacific**

**24-26 October, 2016
Ulaanbaatar, Mongolia**

**COUNTRY REPORT ON PAPUA NEW GUINEA
INTERNATIONAL HYDROLOGICAL PROGRAM
ACTIVITIES: 2015 – 2016**

Prepared & presented by:

Joseph Jure

For

Papua New Guinea IHP National Committee

1.0 INTRODUCTION

The Conservation & Environment Protection Authority (CEPA) is a new statutory authority which has replaced the Department of Environment and Conservation (DEC). CEPA was established by an Act of Parliament in May 2014 and became officially effective in January 2015 and has participated in the activities of the International Hydrological Program Decade (IHPD) from 1965-1974 under DEC, the forerunner of the International Hydrological Program (IHP). With the launching of the latter in 1992, the Papua New Guinea (PNG) IHP National Committee was formed in January 1992 with a view to participating actively in IHP and regional programs such as the Asia Pacific FRIEND.

The current membership of the PNG IHP National Committee is maintained at eight (8), and drawn from various government agencies and institutions of higher learning, including now office of climate change and national disaster reduction agencies. Over the period 2015-2016, PNG experienced very little participation in IHP and UNESCO activities. This resulted from unexpected political developments leading to our physical displacement and change in the administrative structure.

The National Government has driven this key policy initiative known as the Alatau Accord. It includes policy initiatives on “**Green Policy on Sustainable Development and Renewable Energy**”. Among the three key policies were; free education, improved health services and infrastructure development. The latter is our main concern, which has impeded on the natural environment while driving this policy. The government also envisages economic growth on one hand but on the other hand expects integration of sound environment management principles so that the environment is not degraded. Furthermore, these principles are also consistent with the national development policies and United Nations Sustainable Development Goals, particularly on environmental sustainability. The climate change adaptation uses water as the main influencing medium in preparing strategies for water related disasters and climate change, which consequently contributed to human livelihood.

As a result of many natural resource developments taking place during our short history the government has called on all line agencies to improve water and environment monitoring networks that has catered for development needs, climate change analysis and adaptation, promoting prudent environment management and monitoring food security.

2.0 ACTIVITIES ORGANIZED BY THE NATIONAL COMMITTEE

The significant water events organized at national levels include;

- (a) World Water Day commemoration was held in March 2016,
- (b) World Environment Day commemoration was held in June 2016,
- (c) Regular Climate Change Adaptation Technical Working Group meetings,
- (d) Ad-hoc Early Warning System on coastal and inland floods sub-committee meetings

- (e) Water and Sanitation Hygiene Committee Meetings,
- (f) Hydropower Project Steering Committee Meetings, and
- (g) Supply of Hydrological data to the Department of Works (DoW).

3.0 OTHER HYDROLOGICAL AND WATER RELATED ACTIVITIES CONDUCTED BY INDIVIDUAL WATER AGENCIES

3.1 Flood Projection and Monitoring

Basic flood projection and monitoring which have been identified in the northern part of PNG for climate change adaptation programs. In addition, this year alone we see more new locations are being proposed for possible expansion.

In addition, early warning systems and flood forecasting were proposed especially for the locations mentioned above. Climate Change & Development Authority (CCDA) and CEPA are coordinating agencies for this program, while PNG National Weather Service (NWS) and National Disaster (NDO) Office are the executing agencies.

The agreement between the Regional Integrated Multi-Hazard Early Warning System (RIMES) and the national partners including CEPA was signed in October to strengthen capacities for an end to end early warning system, which flooding is a major component.

3.2 Hydropower Development for Clean and Green Energy

The new hydropower schemes proposed are been encouraged to be climate compatible. This clean energy agenda will be driven by a policy shift and now adoption of Sustainable Development Goal, which will require proponents to abide by the legislations promoting clean energy through environment regulation and climate change policy.

New hydropower scheme being planned are;

- (a) Small urban town electricity schemes - 5MW power supply for small urban town being funded by Asian Development Bank (ADB),
- (b) Laloki River hydro scheme (Central Province)–the 10-20 MW of electricity supply is an additional power to be supplied to Port Moresby,
- (c) Divune River hydro scheme (Oro Province)–10 MW to supply electricity to Popodetta township and parts of Northern Province,
- (d) A major hydropower project is being proposed for the Chimbu Province, where Wara Simbu has been identified to generate 1200Mw electricity.

3.3 Water, Sanitation and Hygiene (WaSH) Activities

Papua New Guinea government has passed the National Water, Sanitation and Hygiene (WaSH) Policy. The policy has been formulated to provide a framework to improve access to water and sanitation services and to change hygiene behaviours, particularly to the currently underserved rural and peri-urban settlement areas. It aims to provide

direction for planning, management, investments and activities for all sector stakeholders in order to achieve the policy objectives.

Once we have the legislative framework in place through the WaSH Authority Bill, it will pave way for mandated agencies to integrate the policy into their respective sector planning and budgeting processes. The core focus is to include hygiene and rural water supply & sanitation activities into the sector programs. The National Department of Health (NDoH), Department of National Planning & Monitoring (DNPM), CEPA, Childfund, Water Aid, World Vision and Unicef are the agencies implementing WaSH activities.

3.4 Extraction Permits (Use/Discharge)

CEPA is a cost recovery agency and is implementing a new system of fees and charges on water users. Water use for industrial purposes in particular is regulated under Environmental Act 2000 and CEPA Act 2014. Over the last decade there was an increase in volume of water permitted for extraction. Also, the volume of waste water discharged has risen prompting CEPA to tighten its enforcement and compliance measures.

Funding and capacity have been a concern and this has hindered compliance monitoring activities. However, with the new system in place CEPA can be able to charge fees on water users and fund for its operational cost including compliance, enforcement and monitoring activities.

3.5 Water Pollution

Both natural and man-made conditions has affected or polluted Papua New Guinea's fragile water resources due to his small size, lack of natural storage, competing land use and vulnerability to natural hazards over the last decade.

Pollution of freshwater resources, unsafe drinking water supplies and inadequate sanitation can have a significant impact on public health, quality of life, the environment and economic development.

Urbanization, rural development, growing populations, climate change and increased demand from industry and agriculture is putting further pressure on the country's freshwater resources, threatening the long term viability of inhabitants.

4.0 PARTICIPATION IN REGIONAL PROGRAMS

4.1 Research and publications

- (a) Contributed to the AP River Catalogues Volume VI but late for inclusion, perhaps due to quality issues.

4.2 Trainings

Joseph Jure attended System of Environmental Economic Accounting (SEEA) training on Water and Waste Accounts in Nadi, Fiji from 14 – 16 September 2016. The training was organized by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) themed “System of Environmental-Economic Accounting (SEEA) for Asia Pacific Small Island Developing States”.

4.3 Meetings

Joseph Jure attended the 23rd International Hydrological Program Regional Steering Committee Meeting and International Symposium on “Integrated Actions for Global Water and Environmental Sustainability”; Medan, Indonesia from 19-22 October 2015.

4.4 RIMES Support

Regional Integrated Multi Hazard Early Warning System for Africa and Asia (RIMES) is planning to set up hydrology network (flood forecasting and early warning system) in Papua New Guinea and later planning to expand to the rest of Pacific.

Some of the activities are being proposed by RIMES are capacity development activities including training and resource support.

5.0 FUTURE TASKS

- Attend the 24th IHP RSC Meeting in Ulaanbaatar, Mongolia from 24-26 October 2016,
- Anticipating a candidate from PNG to participate in the upcoming UNESCO IHP training courses,
- Continue engagement with stakeholders on climate change adaptation and disaster risk reduction – climate change, El Nino, hydropower development, rural water supply & sanitation and hygiene,
- Continue providing hydrological and environmental assistance for development needs and environment management,
- Continue to promote sustainable land use practices and principles in areas of resource development (permits and discharge waste water),
- Contribute to regional activities as and when required.

6.0 CONCLUDING REMARKS

Once again, I take this opportunity to thank UNESCO Jakarta office and Mongolia IHP in meeting all the costs to enable me participate in the 24th IHP RSC meeting for the Southeast and the Asia Pacific and most importantly attend the international symposium.

Annex 5 -
Updates from the centres under the auspices of
UNESCO in the Asia Pacific Region

HUMID TROPICS CENTRE KUALA LUMPUR



*The Regional Humid Tropics Hydrology and Water Resources Centre
for Southeast Asia and The Pacific (HTC KL)*

DIRECTOR'S REPORT 2016

24th – 26th October 2016

UNESCO-IHP

**24th Regional Steering Committee Meeting for
Southeast Asia and the Pacific, Ulaan Bataar, Mangolia**



Presentation Outline



Introduction

Seminar / Workshop / Training / Meeting

National Activities

Research Activities

Water Education

Future Programme

Publication

Finance

Forthcoming Issue & Conclusion



Introduction

- HTC KL activities from 1st November 2015 to 30th September 2016 and future activities
- The report highlights events and activities that had taken place since the 23rd Regional Steering Committee Meeting for Southeast Asia and the Pacific UNESCO IHP held in Medan, Indonesia (19th – 22nd October 2015)



International Workshop and Seminar



Workshop on Comparative Studies of Applying Ecohydrology and Integrated Water Resources Management for Upscaling Water Security in Asia and Africa through UNESCO Category 2 Water Centre, 7-9 March 2016, Kuala Lumpur



Asia Water Seminar 2016, the Region's Leading Water Industry Event, 6th – 8th April 2016 in Kuala Lumpur Convention Centre and Seminar on Climate Impact in Malaysia



International Workshop /Meeting



Workshop for Capacity Building on Climate Change Impact assessments and Adaptation Planning in the Asia-Pacific Region: Needs and Challenges for Designing and Implementing Climate Action, 27th -28th January 2016 in Manila, The Philippines

22nd Intergovernmental Council (IGC) UNESCO IHP, 13th – 17th June 2016, Paris.



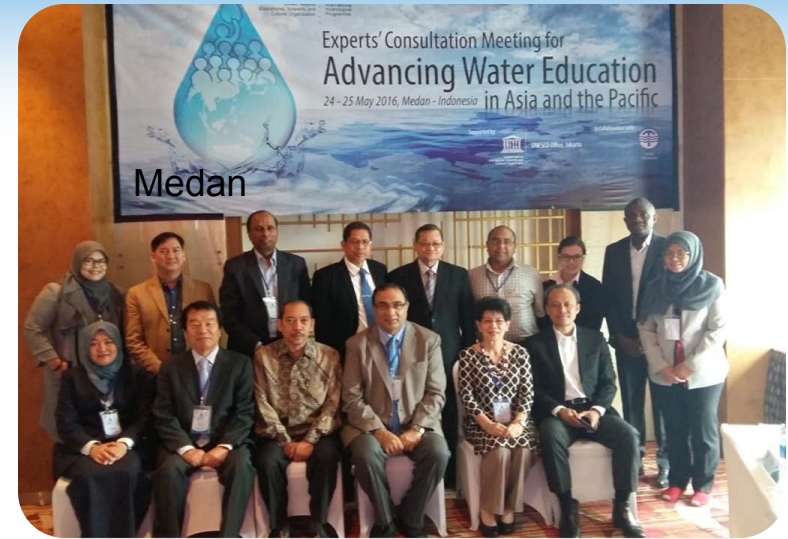
National Activities

Malaysia World Water Day

Water Sport Complex, Putrajaya. *Theme: Water and Jobs, 24th March 2016*



Meeting



Special session on Implementing IWRM to ensure Water Security under the Sustainable Developments Goals (SDGs) in Asia and the Pacific in Singapore on 12th – 14th July 2016



Fostering Collaboration between UNESCO in the Field and Networks Towards the 2030 Agenda, Bali, Indonesia on 21th - 24th July 2016



National Activities



Malaysian UNESCO Day
28-29 May 2016



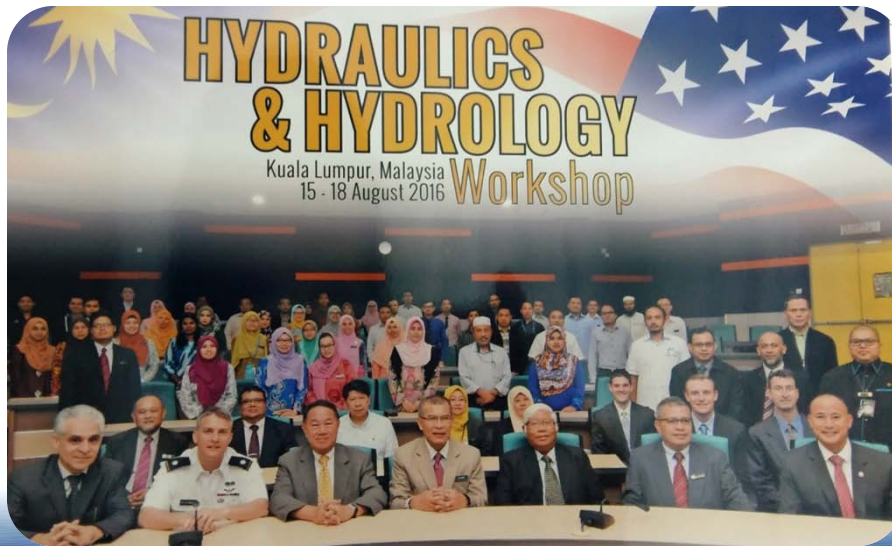
Briefing the Minister of Natural
Resources & Environment on
Debris and Mudflow



Training / Seminar –National Level



Senior Management Conference, Theme *DID Towards Water Security*
29th September-1st October 2016



Hydraulics and Hydrology
Workshop at International Islamic
University Malaysia on 15th -18th
August 2016



Research Activities

NO	TITLE	OBJECTIVE REMARKS	
		Phase IHP-VIII	SDGs (No.6)
1	Debris Mud Flow Warning System (Phase II)	THEME 1 : Water related Disasters and Hydrological Change	6.6 Protect and restore water-related ecosystems
2	Mobile Flood Wall Barrier (MFWB)	THEME 1 : Water related Disasters and Hydrological Change	6.6 Protect and restore water-related ecosystems 6.6a Expand international cooperation and capacity-building
3	Urban Heat Islands (UHI)	THEME 1 : Water Related Disasters and Hydrological Change	6.6a Expand international cooperation and capacity-building
4	Biodiversity Flow at Jenderam River, tributary of Sg Langat (subject to budgetry)	THEME 5: Ecohydrology, Engineering Harmony for a Sustainable World	6.3 Improve water quality
5	Biodiversity Flow at Tasik Chini (Lake)	THEME 5: Ecohydrology, Engineering Harmony for a Sustainable World	6.3 Improve water quality
6	Development of Soil Water Index for Highland Area	THEME 1 : Water related Disasters and Hydrological Change THEME 3: Addressing Water Security and Quality THEME 4 : Water and Human Settlements of the Future THEME 5: Ecohydrology, engineering harmony for a sustainable world	6.5 Implement integrated water resources management at all levels, including through transboundary cooperation as appropriate 6.6a Expand international cooperation and capacity-building

Water Education

Project Output

- 2 Ph.D
- 6 Master's Degree
- 7 Bachelor Degree

External Supervisor & and Practical Training

- 5 visiting students (1Ph.D, 4 undergraduates)
- 1 Practical undergraduate student

Interactive Online Education

- Manual for *Debris and Mudflow Forecasting Software Malaysia* by HTC KL available in Youtube



Technical Visit

06.01.2016



Deputy Minister of Natural Resources and Environment & Delegation



Prof. Kaoru Takara & Delegation, DPRI Kyoto University, Japan & USM



Technical Visit by Polytechnic Port Dickson

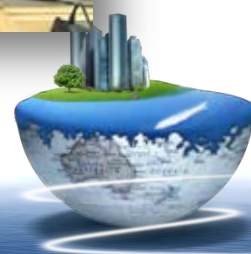


Technical Visit by Mr. Yohannes Zerihun Negessie, Coordinator of Ecohydrology Coordination Office



Technical Visit by Prof. Dr. Sampurno Bruijnzeel, King's College London

Visit by Director General of UNESCO Jakarta & his Delegation



FUTURE PROGRAMME

Dissemination of Modula
Curriculars to UNESCO Water
Centers and Water Families

Training on Urban Stormwater
Management (MSMA) for Ethiopia

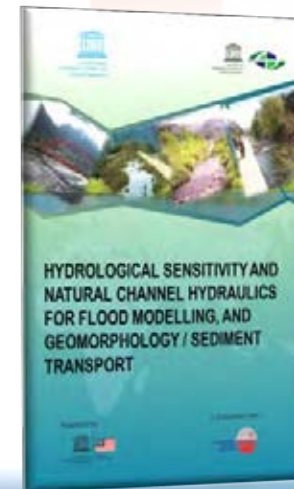
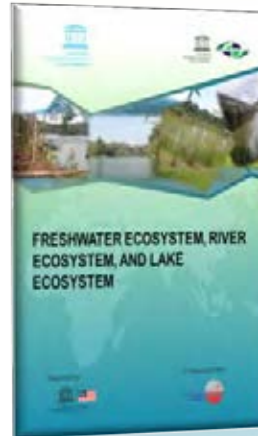
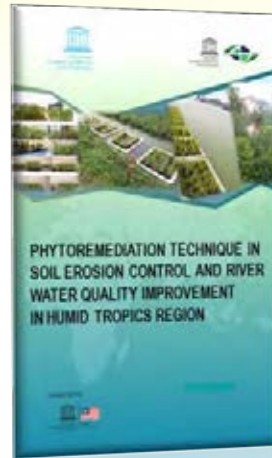
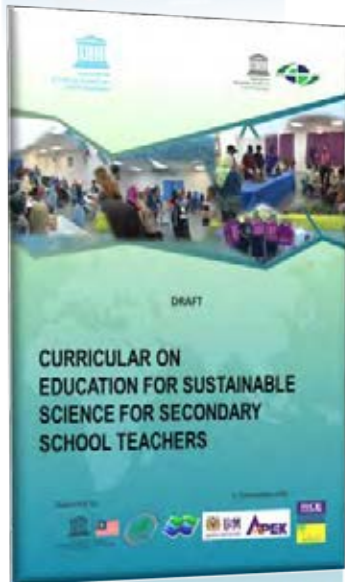
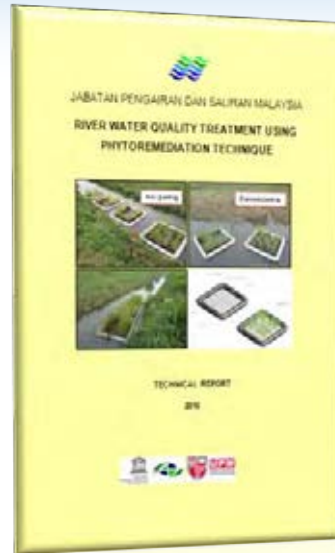
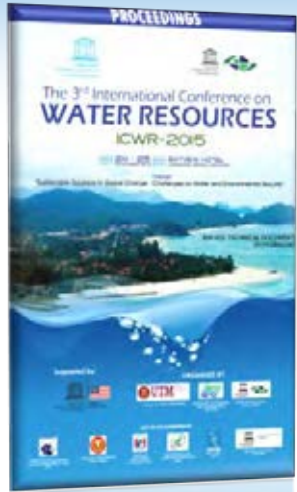
**2017
Activities**

Regional Science Centre
(Category 2) Meeting for Asia
Pacific

Seminar on Water Security
(HTC & ISTIC & Water Centers
Category 2)



PUBLICATION



FINANCE

No.	Component	Amount (USD \$)		Contributing Agency
		2015	2016	
1.	<u>Operation and Maintenance</u>	69,082	128,724	Gov. of Malaysia
2.	<u>Emolument</u>			
	• Staff salary	333,781	333,781	Gov. of Malaysia
3	<u>Sponsorship</u>			
	• Organising Thesis Award	3,125	3,125	• UNESCO MIHP
	• Modular Curricular on Water Education	141,120	-	• MFiT
TOTAL		547,108	465,630	



FINANCE

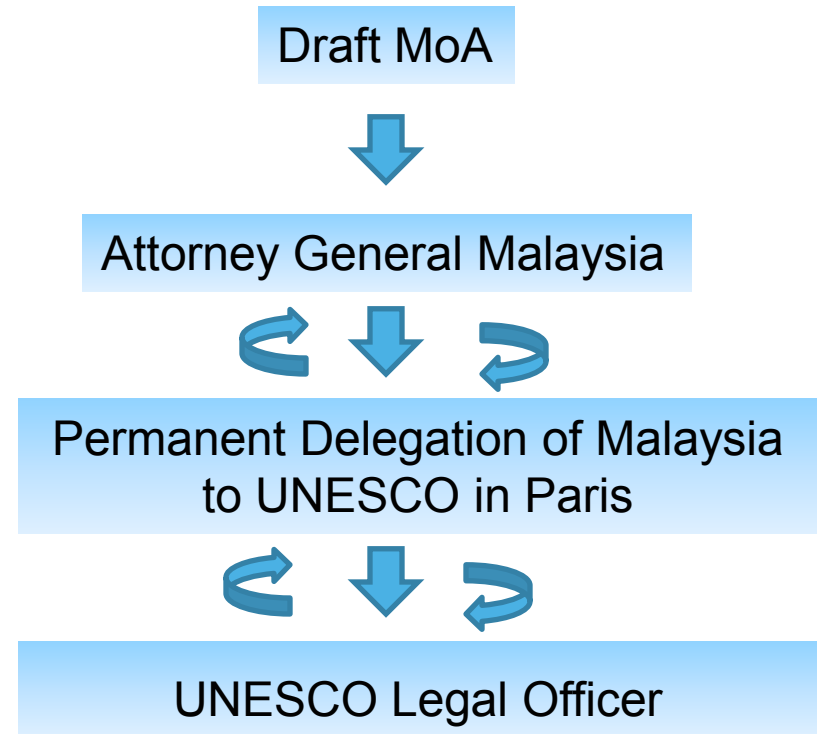
Research and Development

No.	Component	Amount (USD \$)		Contributing Agency
		2015	2016	
1.	Research and Development	351,562	128,572	Gov. of Malaysia
TOTAL		351,562	128,572	



FORTHCOMING ISSUE

- The HTC KL Centre evaluation
- Memorandum of Agreement (MoA)
- Governing Board



Conclusion

Operational

Perform and carry out its obligation under Article 2 of the Agreement.





HUMID TROPICS CENTRE KUALA LUMPUR

No. 2, Jalan Ledang off Jalan Duta,
50480 Kuala Lumpur

Tel 603 20958700 Fax 603 20953366

Email : htckl@water.gov.my

Website: <http://htckl.water.gov.my>




Thank You


APCE – UNESCO SECRETARIAT REPORT for 24th RSC IHP

Ulaan Baatar 24 –26 October 2016

Introduction

- ▶ APCE is a center category II of UNESCO that focuses on ecological approach on the water resources management for providing a sustainable water for the people by harnessing science and technology, education and culture.
 - ▶ APCE commits to contributing in overcoming current and important issues of national, regional and global interests, such as poverty, climate-change adaptation, and disaster risk reduction.
- 

APCE develops excellent expertise and experience in the fields of :

- ▶ Relationships among ecological pattern and hydrological process;
 - ▶ Disturbance and dynamics in natural and anthropogenic ecology and hydrology;
 - ▶ Ecohydrological approaches to biodiversity conservation, environmental management, and ecological restoration;
 - ▶ Integrating hydrology with ecological planning, design, and architecture, or reverse;
 - ▶ Transdisciplinary studies of regional sustainability from scopes of ecohydrology, ecology, or both
- 

Recent Activities of APCE

- ▶ Attended to Strategic Meeting and International Workshop of UNESCO, Jakarta 11–12 March 2015 as Keynote speaker.
 - MOU with HTC KL Malaysia
 - MOU with Tehran Centre
- ▶ Contributed to World water day Workshop in March 24, in Jakarta as Keynote Speaker.
- ▶ Attended to World Water Forum in Daegu Korea in April 2015
- ▶ Attended to UNESCO Water Centres and Chairs Meeting in Malaysia in June 2015
- ▶ Promote joint research project in collaboration with Unesco Jakarta, and several Universities :
 - Advanced Development of Ecohydrology Demonstration Site in the Saguling Reservoir, the Upper Citarum River basin, Indonesia
 - Study on the implementation of Ecohydrology approach and avoided deforestation in Peatland Rewetting and Conservation in Ex-Mega Rice Project location : Cases on food crops areas and on oil palm plantations areas
- ▶ Meeting with Rector of Gajah Mada University for Yogyakarta Action Implementation
- ▶ Workshop of preparation for Yogyakarta Action Implementation
- ▶ Workshop of Saguling Demosite in Cibinong
- ▶ Workshop of Peatland management in Banjarbaru

Promote joint research project in collaboration with Unesco Jakarta, and several Universities

- Advanced Development of Ecohydrology Demonstration Site in the Saguling Reservoir, the Upper Citarum River basin, Indonesia
- Study on the implementation of Ecohydrology approach and avoided deforestation in Peatland Rewetting and Conservation in Ex-Mega Rice Project location : Cases on food crops areas and on oil palm plantations areas

Next Activities

- ▶ In order to support the IHP Phase VIII programs, APCE–UNESCO will focus to develop understanding and practices of ecohydrology through research, training and knowledge exchanges, information systems and public awareness, mainly on theme 5 related to ecohydrology, engineering harmony for a sustainable world by :
 - Promoting local resources base ecohydrological research
 - Strengthening local capacity to adopt ecohydrological concept and approach
 - Providing easy access to local resources based ecohydrological information and knowledge
 - Enhancing public awareness of local resources based ecohydrological practices
- ▶ RSC Meeting of IHP in Mongolia October 2016
- ▶ Workshop of Yogyakarta Action Implementation in Yogyakarta, November 2016
- ▶ Joint research with Unesco Jakarta for 2 topics

Inauguration of New Executive Director of APCE-UNESCO



Inauguration of Demosite Ecohydrology in Saguling West Java



Water Centre and Chairs Meeting in Kuala Lumpur, Malaysia



Workshop on Sustainable Management of Peatland : Palangkaraya University, Lambung Mangkurat University, BALITTRA, Balai Rawa, Balai Sungai Kalimantan II



Indonesia Power Support Saguling Demosite Implementation



Meeting with Rector of UGM for Yogyakarta Action Implementation



Workshop of Saguling Demosite : APCE – LIPI – UGM – IPB



National Workshop on Sustainability of Water Resources Management in Yogyakarta Province, October 2016

- ▶ Local partners : Geografi UGM, Pemprov DIY, NGO
- ▶ Theme : “ Ecohydrology Approach for Sustainability of Water Resources Management in Yogyakarta Province”
- ▶ Participants : 60
 - University community : Heru Hendrayana (Faculty of Geology UGM)
 - Local community
 - Pemprov DIY
 - Balai Besar Wilayah Sungai
 - Balai Konservasi Candi
- ▶ Time : 12 – 14 October 2016
- ▶ Venue : Hotel Eastparc, Yogyakarta

APCE COLLABORATION

- ▶ APCE – UNESCO develop collaboration with different institutions :
 - UNESCO Jakarta Office
 - MAB – UNESCO
 - MOST (Management of Social Transformation)
 - MOW (Memory of The World)
 - ICHARM, Japan
 - HTC Kuala Lumpur, Malaysia
 - ICUWRM, Tehran – Iran
 - ANU & University of Canberra, Australia
 - University of Queensland Australia
 - Kyoto University
 - ILEC, Japan
 - UGM, Yogyakarta – Indonesia
 - IPB, Bogor – Indonesia
 - UNLAM, Banjarmasin, Indonesia
 - University of Palangkaraya, Indonesia
 - University of Timor, Indonesia
 - Ministry of Environment and Forestry
 - Ministry of Public Work and Housing

Thank You...



United Nations
Educational, Scientific and
Cultural Organization

ICHARM

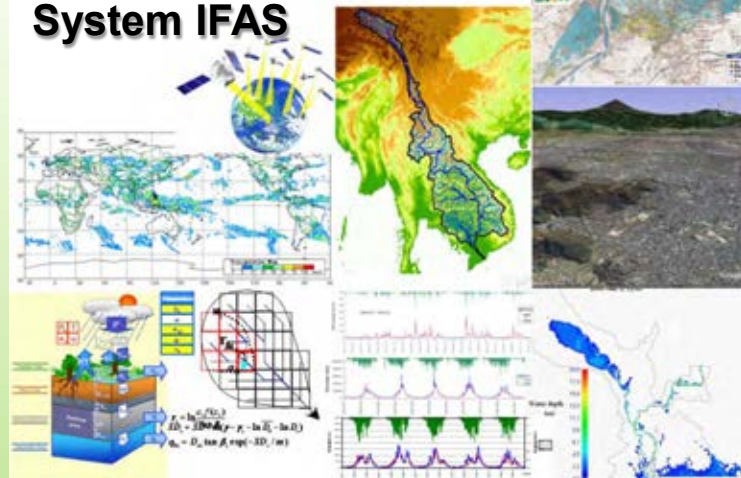
International Center for
Water Hazard and Risk
Management
under the auspices of UNESCO
hosted by PWRI, Tsukuba

Objective: To serve as the Global Center of Excellence to provide and assist implementation of best practicable strategies to localities, nations, regions and the world to manage the risk of water related hazards including floods, droughts, land slides, debris flows and water contamination

6 March, 2006
at Tsukuba



Advanced Early Warning System IFAS



ICHARM members

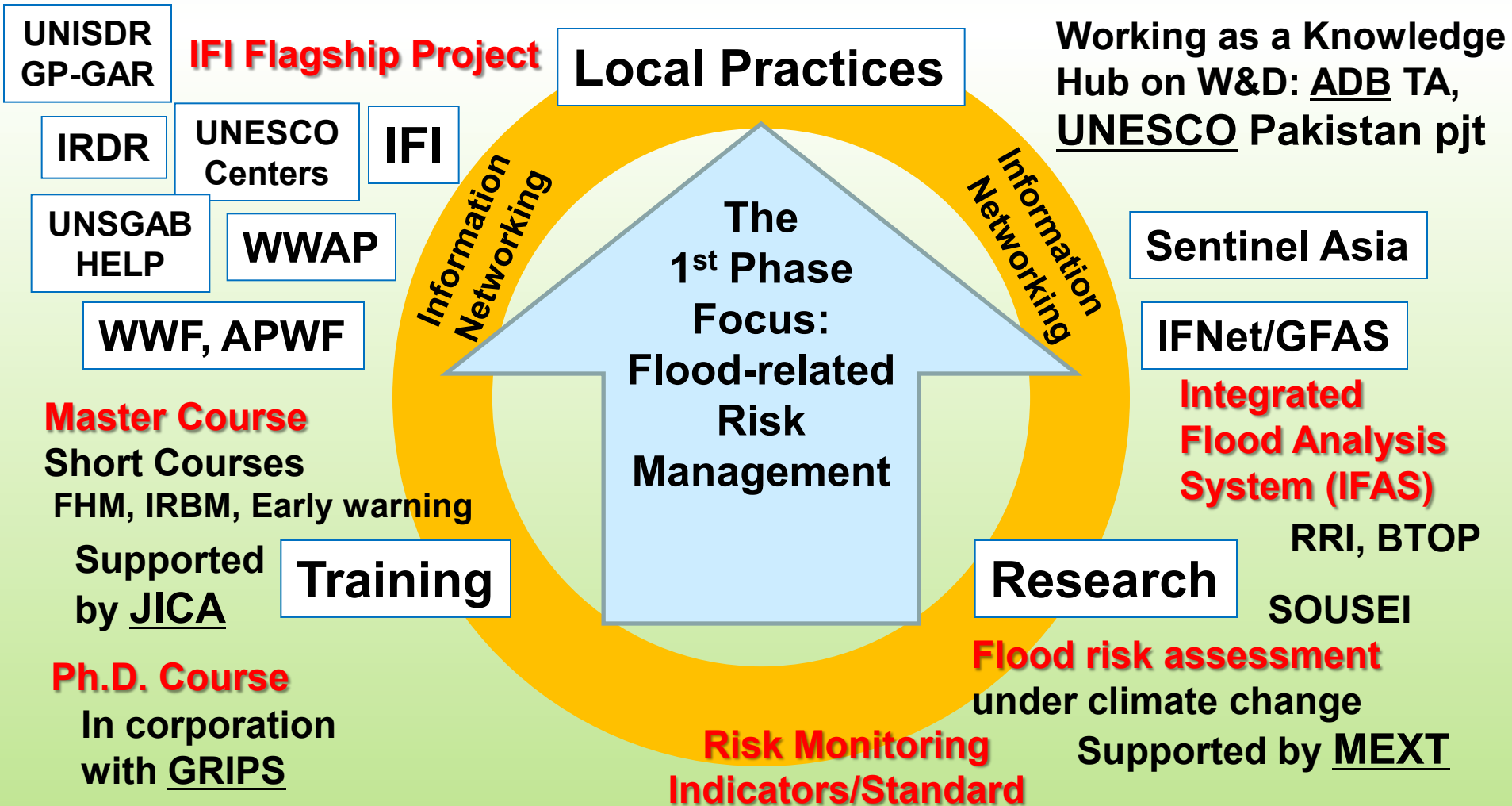
(July 2016)



Total 44 members + 6 PhD members

ICHARM's Challenge: Localism

Delivering best practicable knowledge to local practices



Long Term Targets

Data & Statistics



Risk Assessment



Risk Change
Identification



Support in
Sound Policy-making

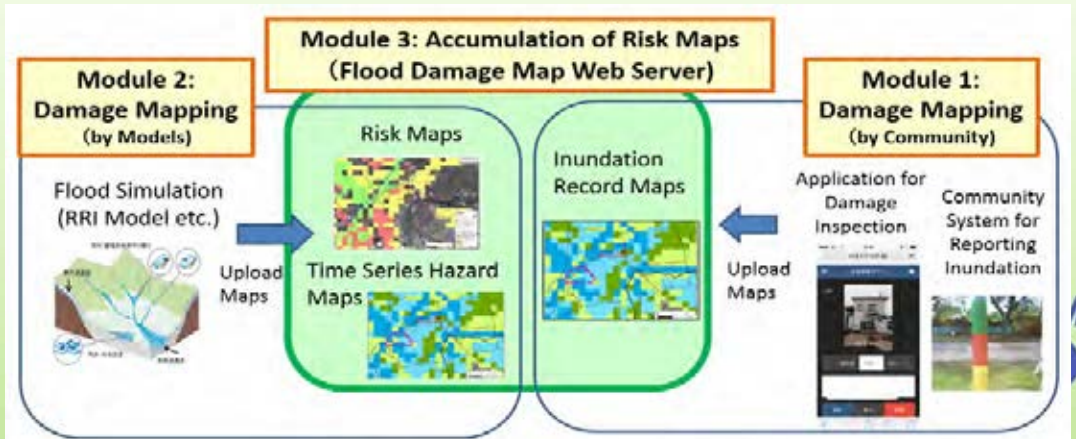
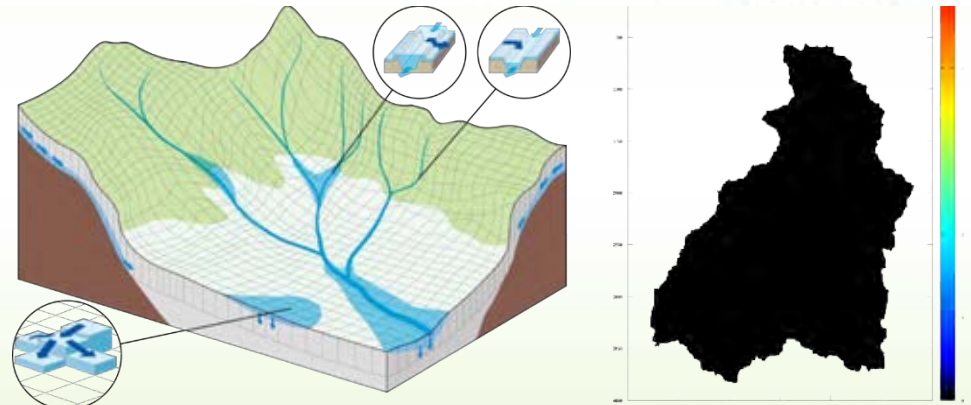
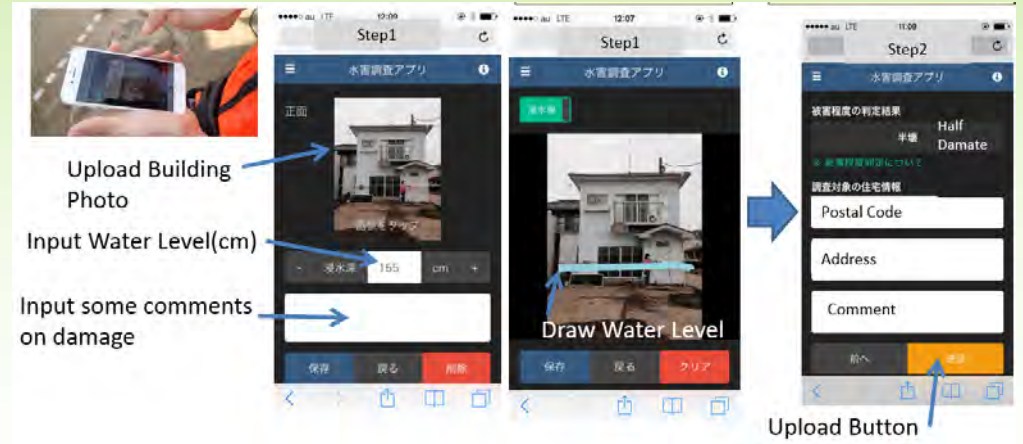
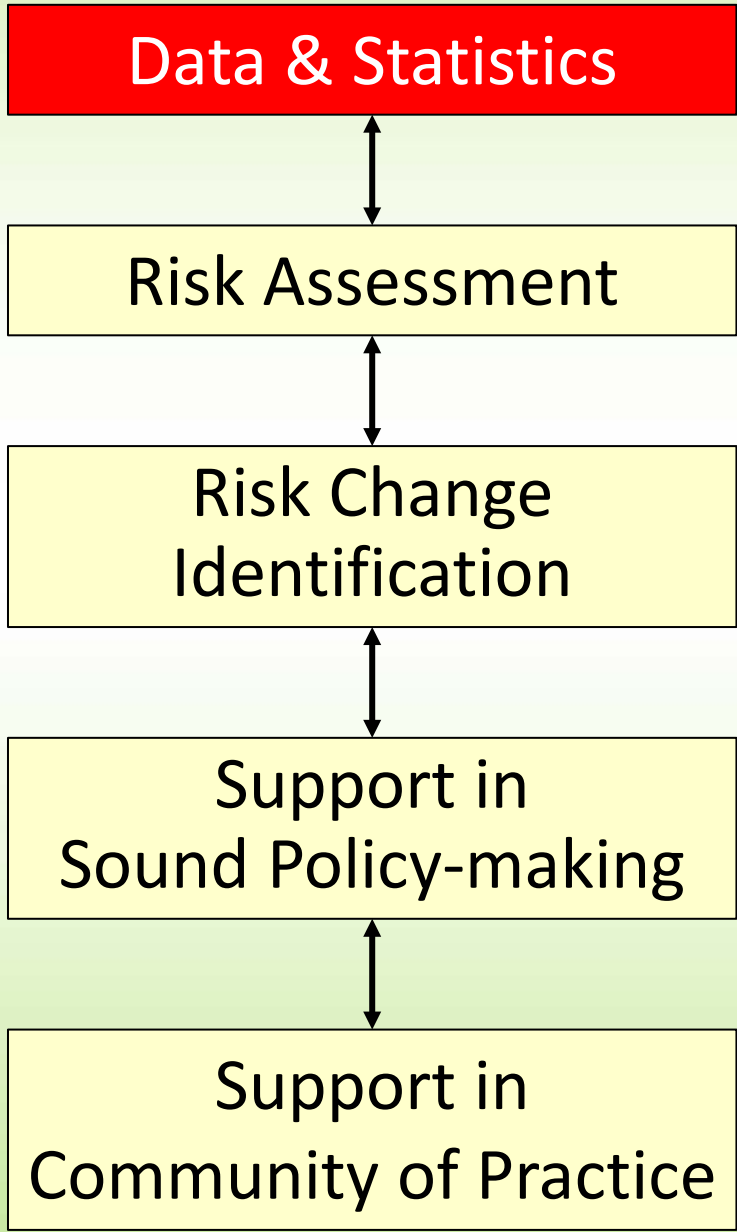


Support in
Community of Practice

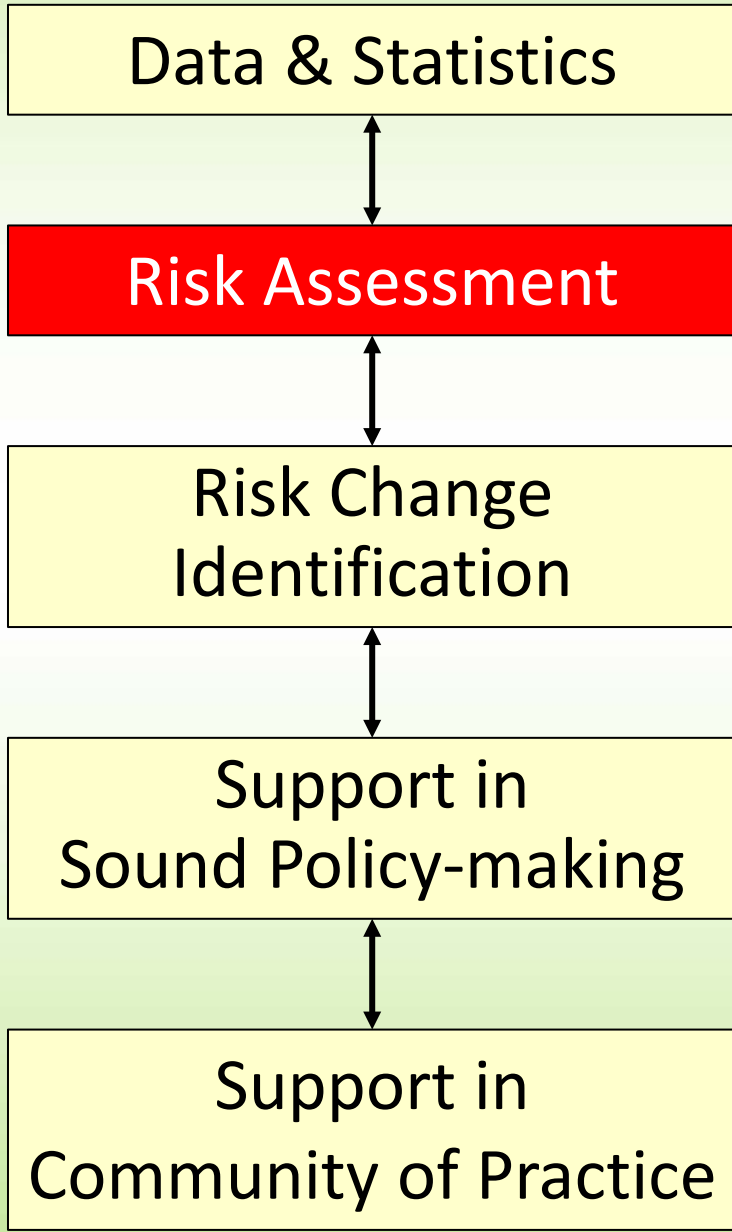
- Promoting data collection, storage, sharing, and statistics
- Integrating local data, satellite observations and model outputs
- Developing integrated disaster risk assessment
- Identifying locality and commonality
- Monitoring and predicting changes in disaster risk
- Identifying locality and commonality
- Analyzing and formulating policy ideas
- Visualizing values of preparedness and investment efficiency
- Improving disaster literacy
- Promoting co-design and co-implementation among stakeholders



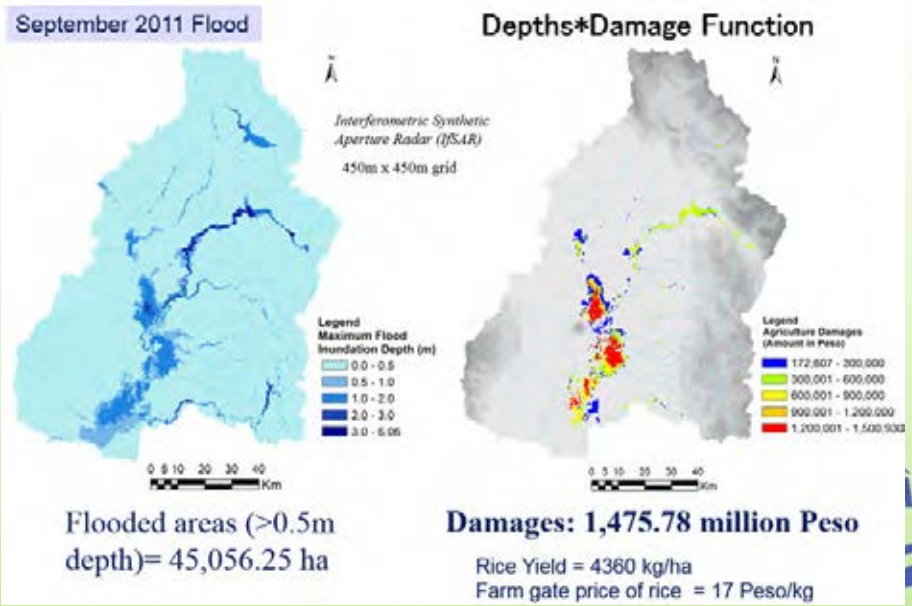
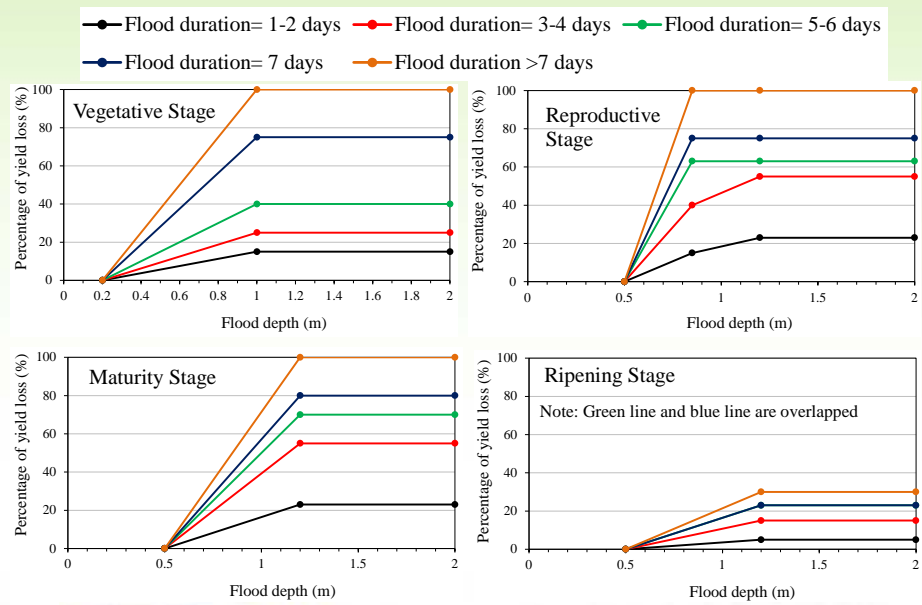
Long Term Targets



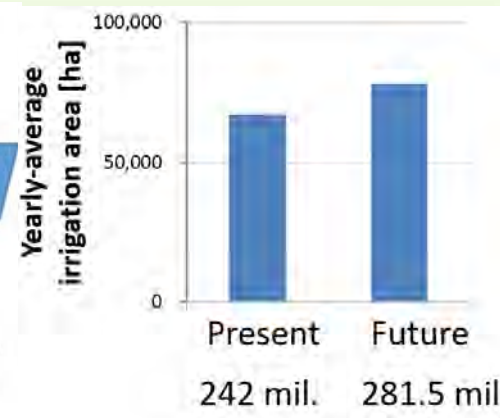
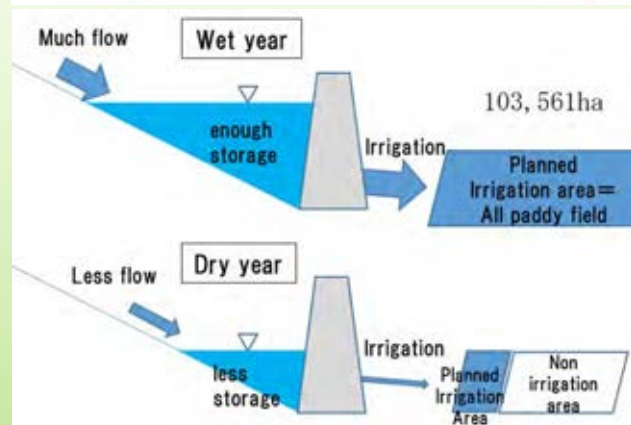
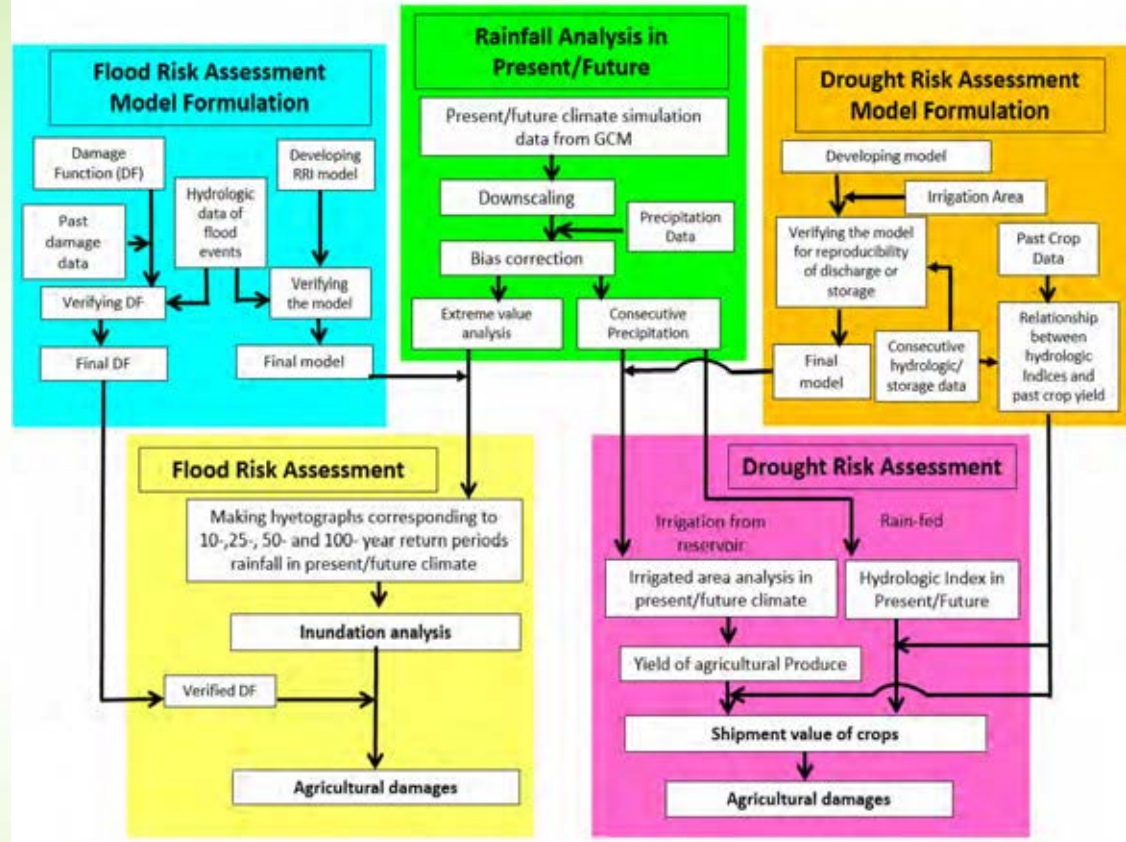
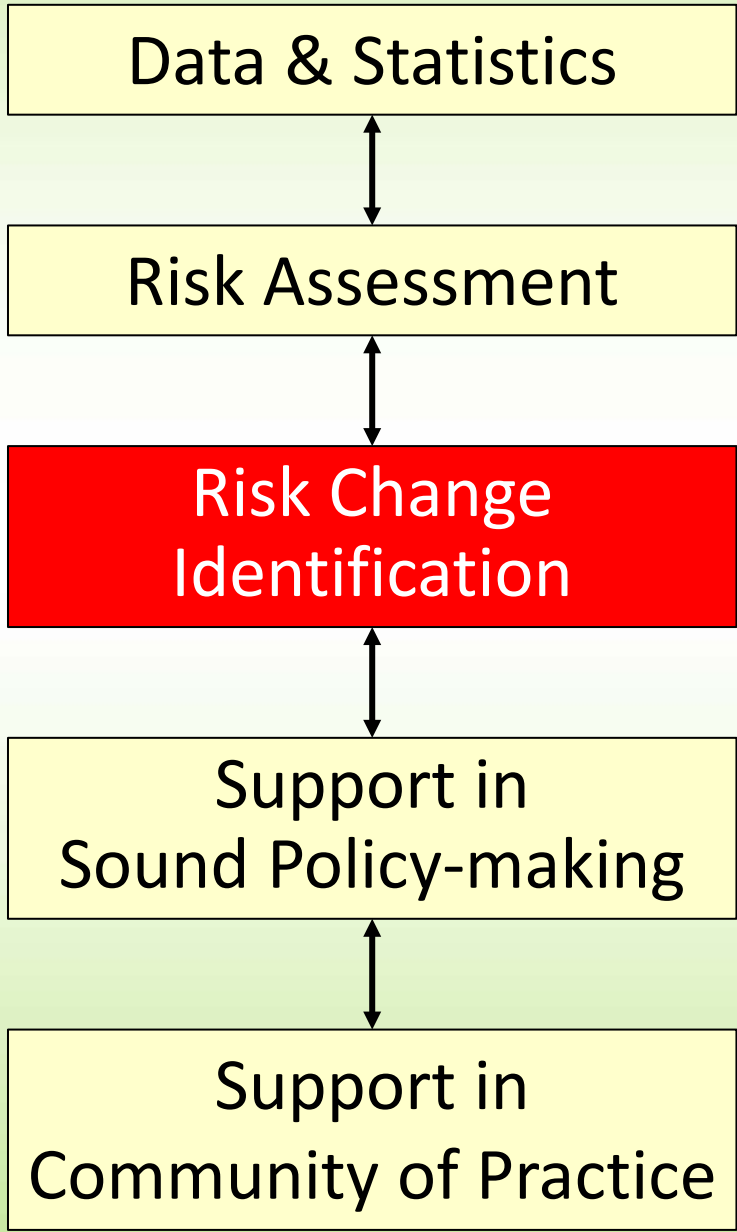
Long Term Targets



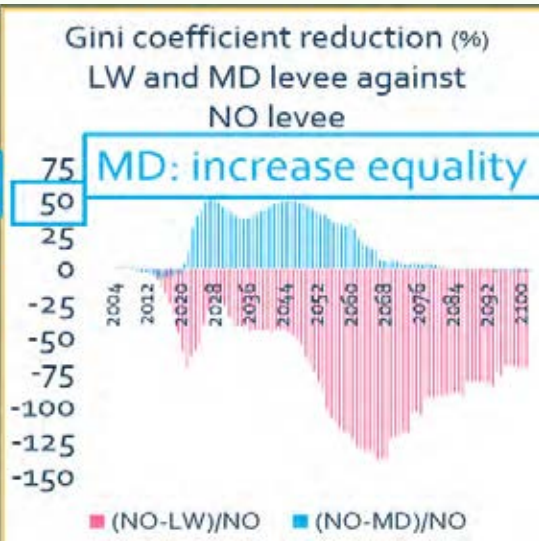
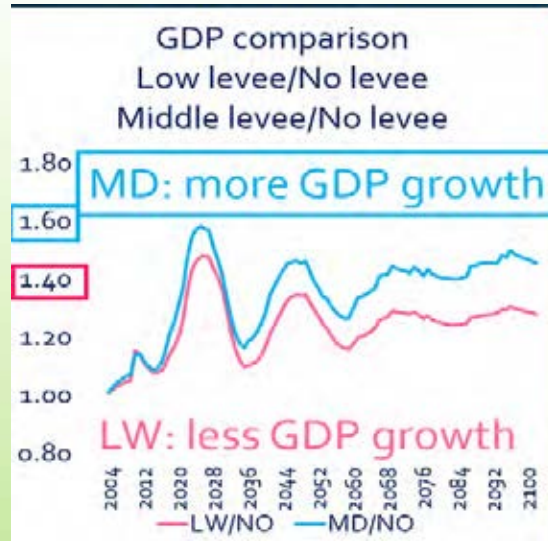
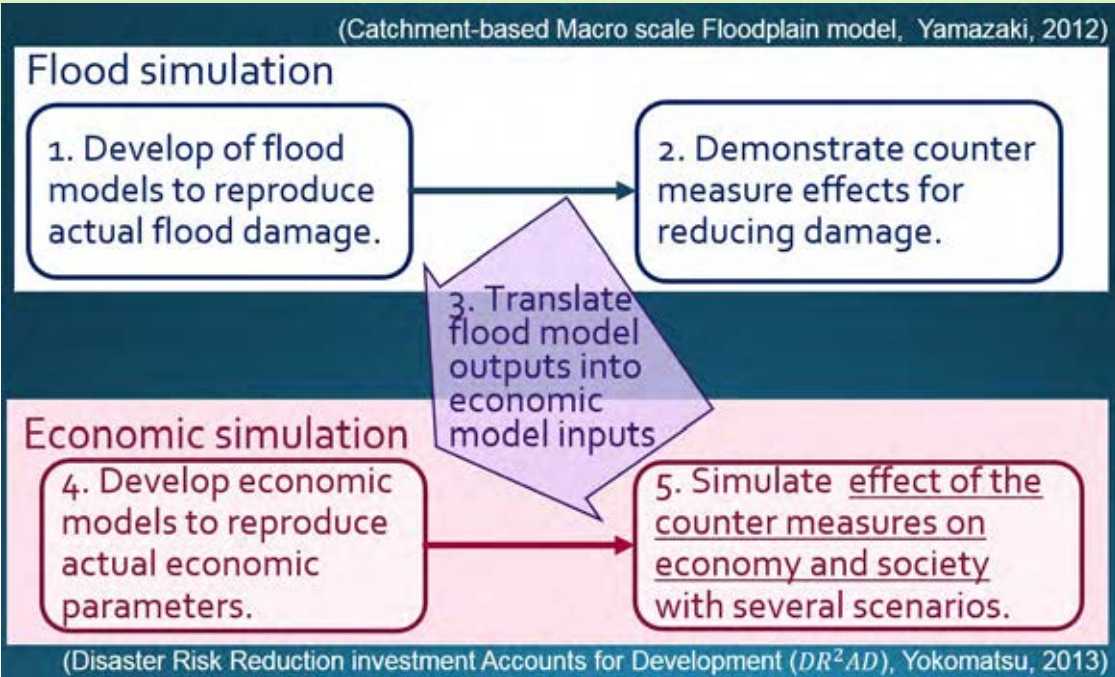
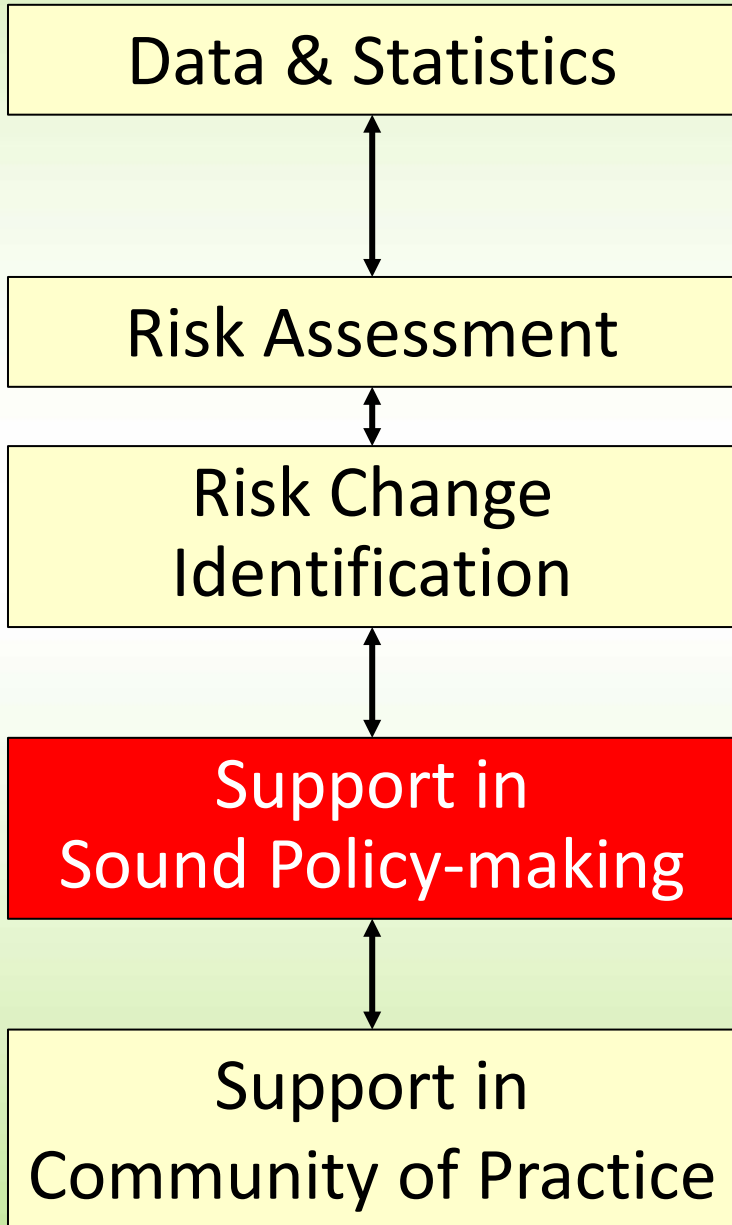
Crop Damage Function



Long Term Targets



Long Term Targets



Long Term Targets

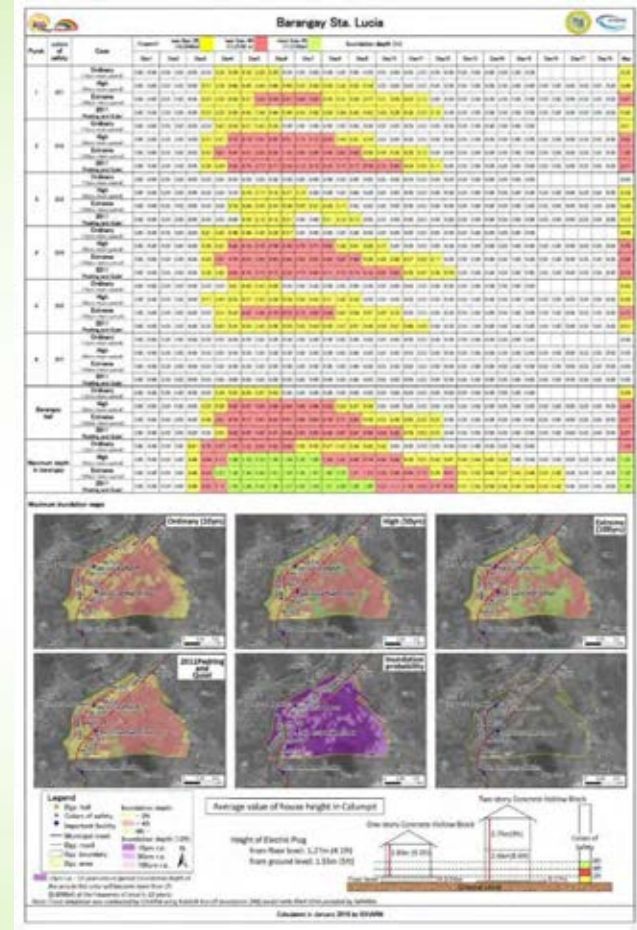
Data & Statistics

Risk Assessment

Risk Change Identification

Support in Sound Policy-making

Support in Community of Practice



Cooperation with water centers and other UNESCO activities

- UNESCO-IHE, Delft
- IRTCES, Beijing
- ICWaRM, Washington, DC
- RCUWM, Tehran
- ICWRGC, Koblenz
- RCTWS, Cairo
- HTCKL, Kuala Lumpur
-
- IHP RSC (Regional Steering Committee) since 1993
- WWF, Regional WWF
- UNSGAB, HELP
- IHP IGC, Kovacs Colloquium



Thank you for your support for 10 years!



10th Anniversary

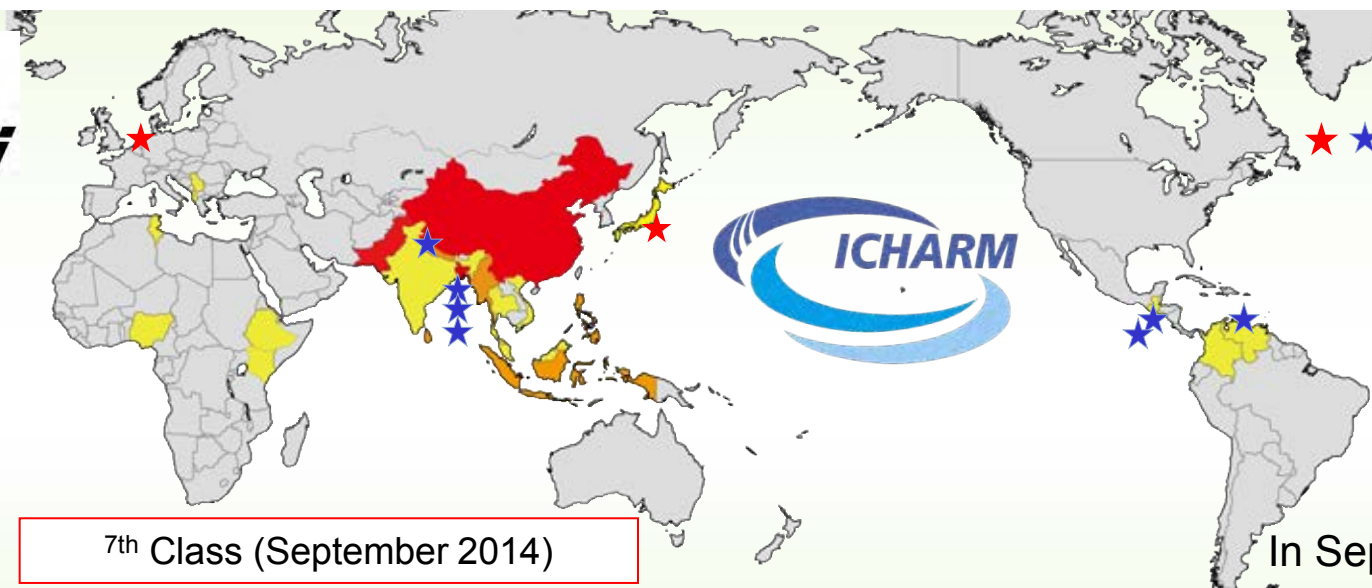
Capacity Development Programs

- **Short training courses** Targeted to organizational capacity development since 2009
 - Hazard maps, IFAS & local preparedness (2004-, JICA)
 - Tsunami (2008, ISDR), CC adaptation (2010, JICA)
 - Pakistan Flood WSs (2011-12, UNESCO) etc. etc.
- **Follow-up seminars** at trainees local nations (2006- JICA)
 - KL 2007, Guangzhou 2008, Manila 2009, Hanoi 2010, BKK 2012, Dhaka 2013, KL 2014
- **Master Course** on **Water-related Disaster Management** with GRIPS (National Graduate Institute for Policy Studies) supported by JICA
 - 10 ('08), 7 ('09), 12 ('10), 12 ('11), 19 ('12), 12 ('13), 12('14), 13('15), 13('16), M1: 11
- **Ph.D. Course** on **Disaster Management** with GRIPS
 - 1 ('13), 1('14), 2('15), 3('16), D3: 1, D2: 2, D1: 2

Nationalities of MC and Ph.D. graduates and students

In Oct 2015

109 MS & 7 PhD graduated. 11 MS & 5 Ph.D. students studying.



7th Class (September 2014)

In Sept 2014



Second PhD (2014)

Research on disaster risk management

● **Early Warning**

- Rainfall, Flood discharge and inundation

● **Risk Assessment**

- Hazards, Exposure, Vulnerability, Resilience

● **Other subjects**

- Satellite Rainfall measurement, ADCP, WRF
- Debris-flows, Water Quality, Drought analyses

● **Projects**

- PWRI projects
- MEXT Kakushin (2007-12), Sousei (2012-17)
- UNESCO, ADB, JICA

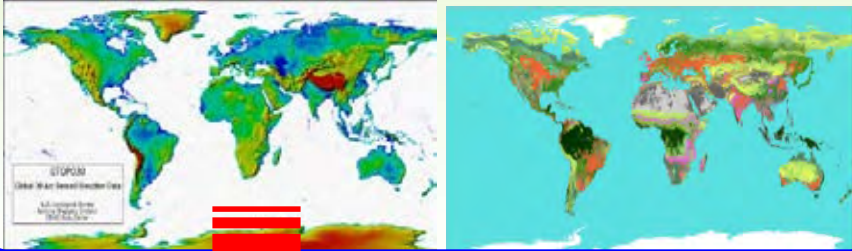
Hydrological models

- IFAS
- RRI
- BTOP
- WIN-DHM

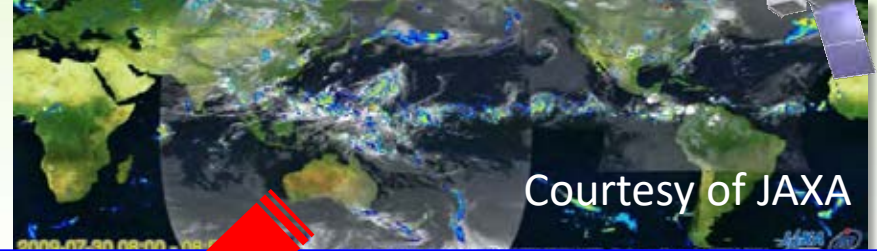


Early Warning System - IFAS (Integrated Flood Analysis system) for insufficiently observed basin

Global data: topography, land use, etc.



Import **satellite rainfall** and **ground-gauged data**



input

Run-off analysis by PWRI **distributed tank model**

Surface model

input

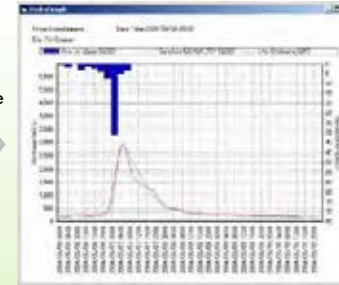
Output: River discharge, Water level, Rainfall distribution

Model creation



Aquifer model

River course model



Judge by River management authorities

Alert message by E-mail

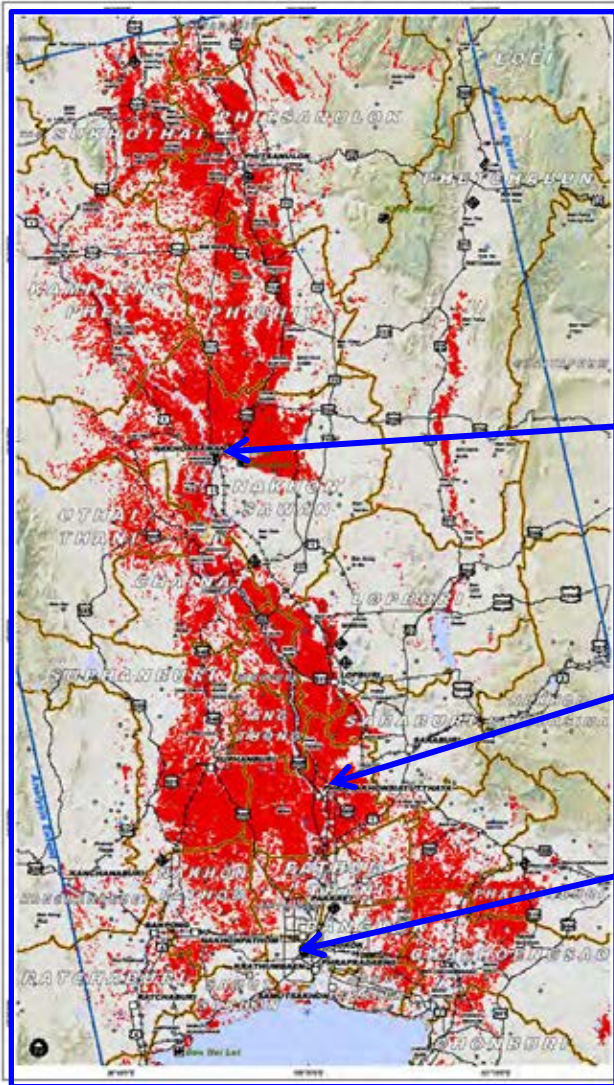
and on the display for river management authorities

Discharge reaches warning level

21 Evacuate from dangerous areas

13 Oct, 2011 by MODIS

UPDATE2: OVERVIEW OF FLOOD WATERS OVER CENTRAL PROVINCES, THAILAND



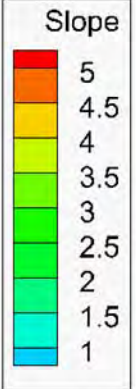
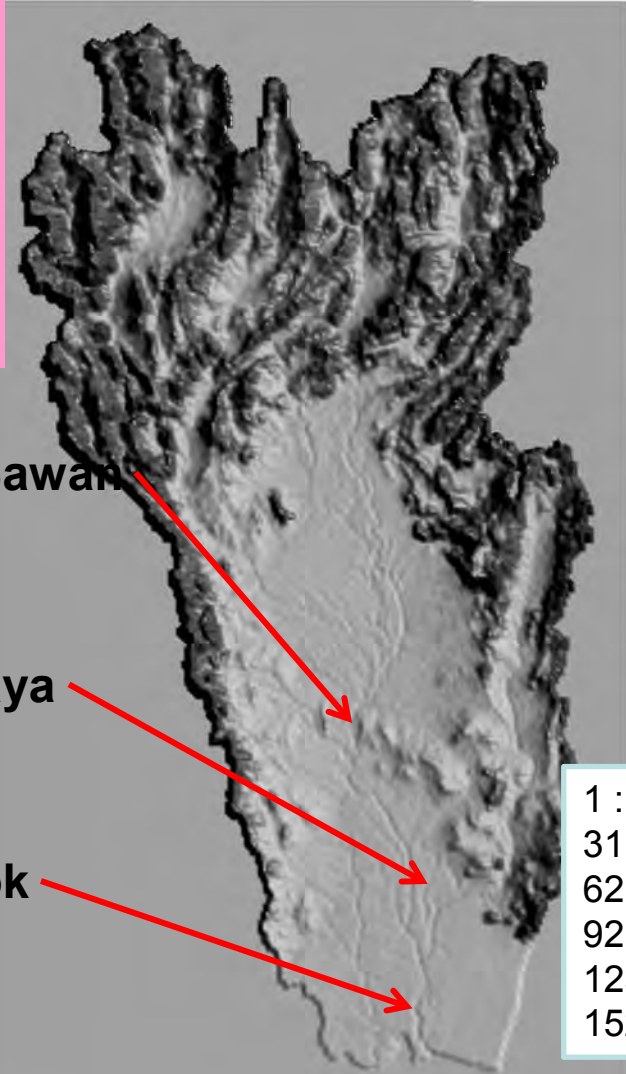
Emergency inundation Simulation in Chao Phraya river basin in Thailand as of Oct.14, 2011

Nakhon Sawan

Ayutthaya

Bangkok

Simulation on Oct 14, 2011 by ICHARM



T = 1

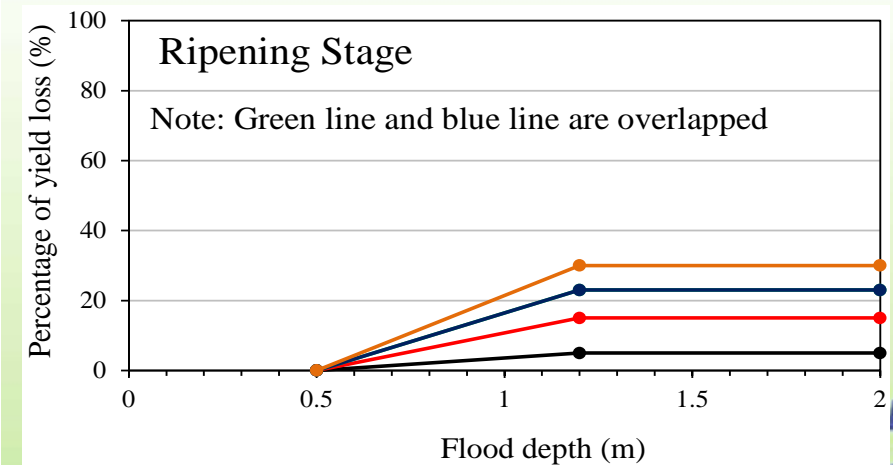
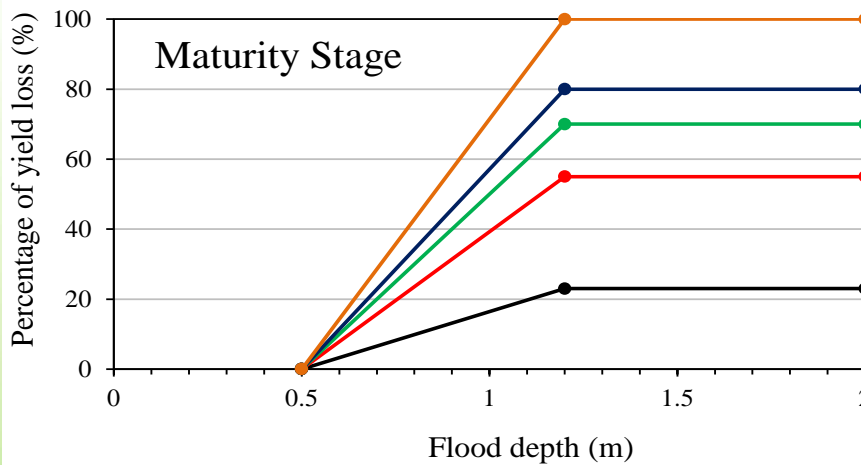
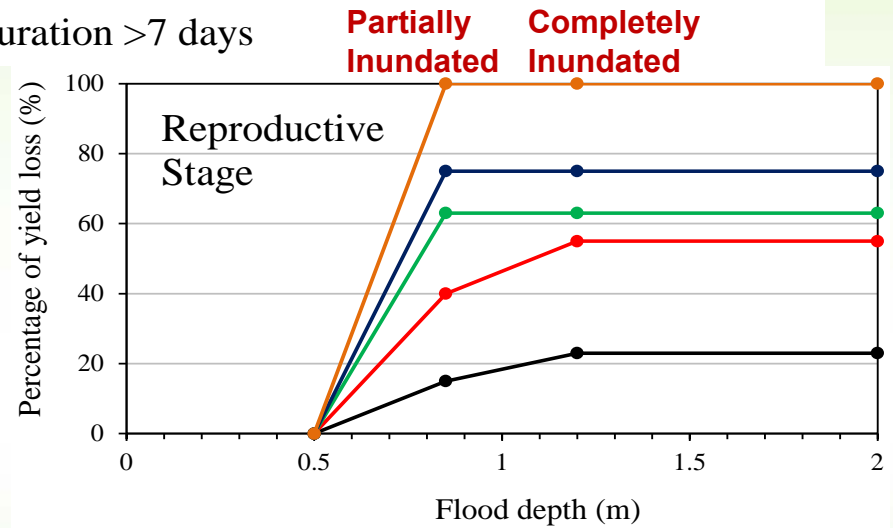
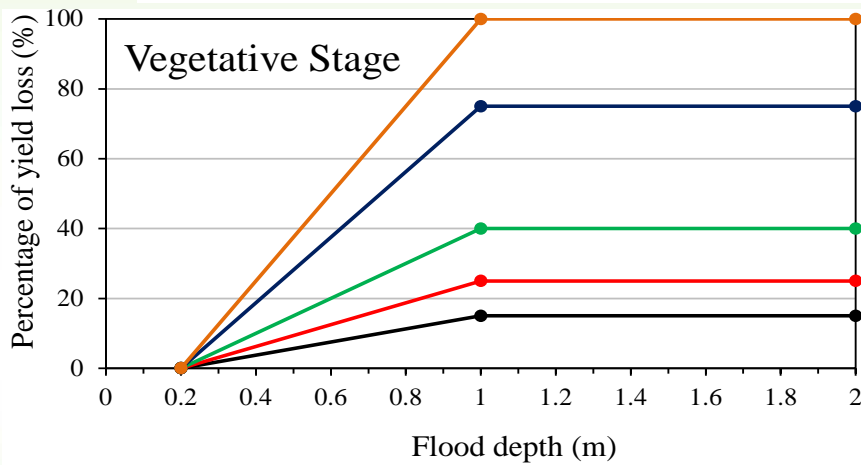
- 1 : July 2
- 31 : Aug 1
- 62 : Sep 1
- 92 : Oct 1
- 123 : Nov 1
- 152 : Nov 30



Risk Indicator (Agriculture Damage)

Flood Damage Curve (Fragility Curve) for Rice-crops

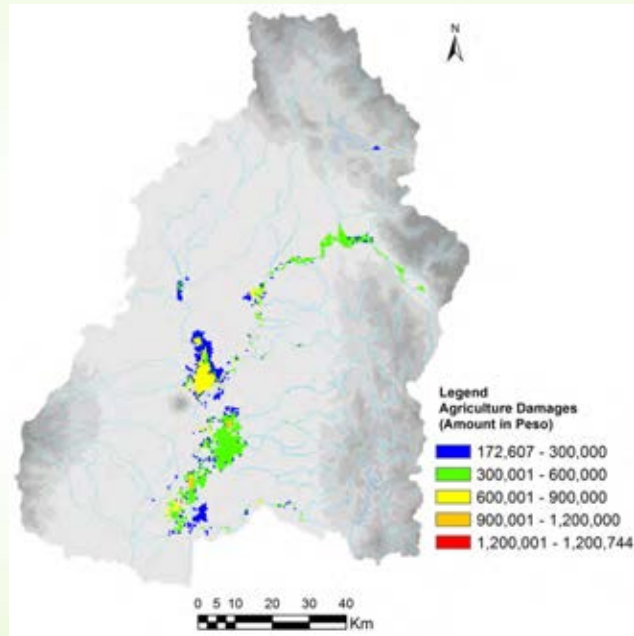
- Flood duration= 1-2 days
- Flood duration= 3-4 days
- Flood duration= 5-6 days
- Flood duration= 7 days
- Flood duration >7 days



Flood Risk Assessment in Pampanga River Basin

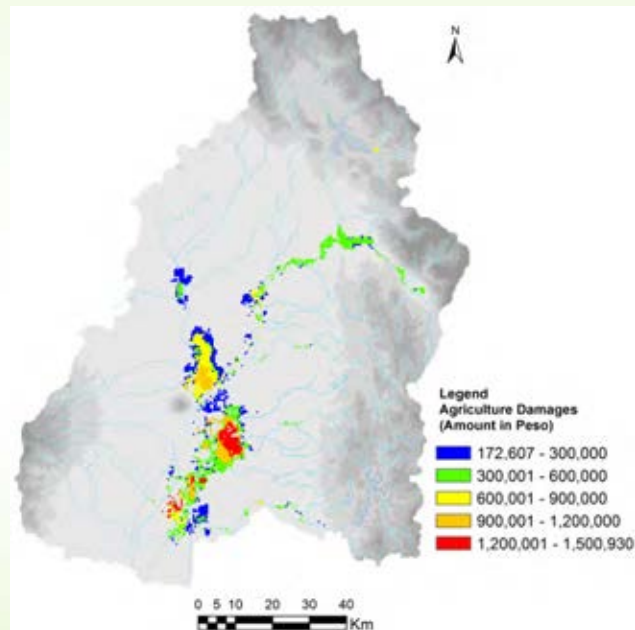
Agricultural Damage Assessment: *Different Flood Scale*

Distribution of Calculated Agricultural (Rice-Crops) Flood Damage



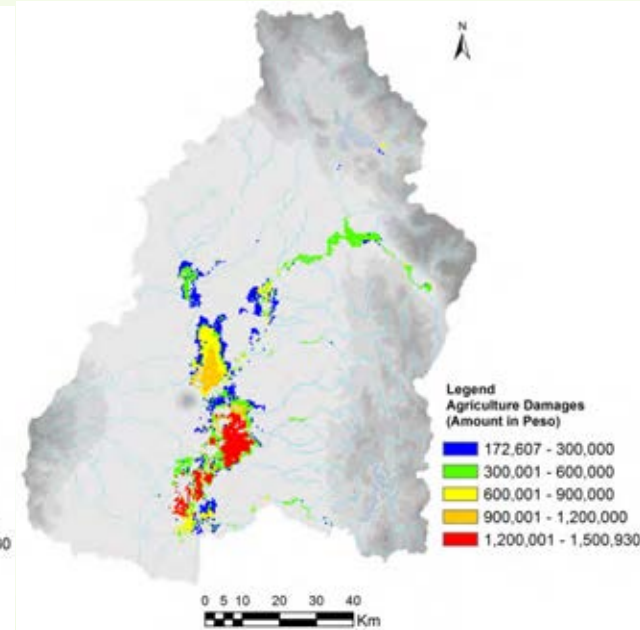
25-Year Flood

Estimated damage:
737.32 million Peso



50-Year Flood

Estimated damage:
1327.55 million Peso



100-Year Flood

Estimated damage:
1952.22million Peso

Using IfSAR DEM

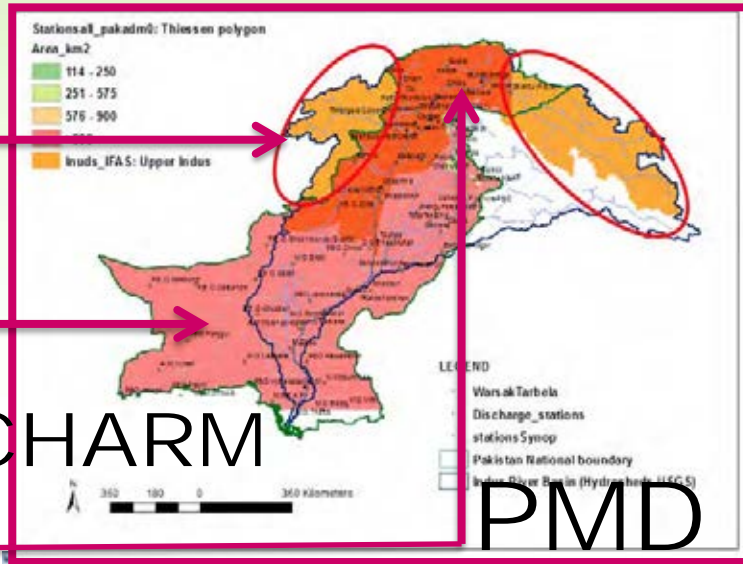
Local Practices with Local People

- **UNESCO Pakistan project (2012-15, 2016-)**
 - IFAS, RRI, Rainfall, Flood discharge and inundation
- **ADB TA7276-REG (2009-13) → Sousei (-17)**
 - IFAS, RRI, Exposure, Vulnerability, Resilience
 - Philippines, Cambodia, Indonesia, Bangladesh
- **ADB Myanmar project (2014-)**
- **MEXT Kakushin (2007-12), Sousei (2012-17)**
- **JICA**
- **PWRI**

Indus-IFAS: flood forecasting system based on IFAS/RRI (UNESCO-Pakistan project 2012-15, 17-)

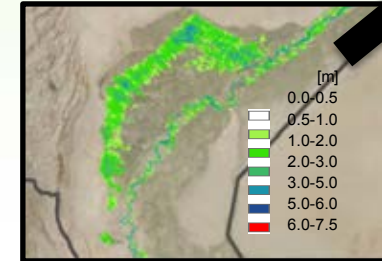
INPUT DATA CHALLENGES:

- Lack of transboundary data
- Null-Low rain gauges network density
- Uncertainty on snowmelt



JAXA, SUPARCO

Inundation area by RRI

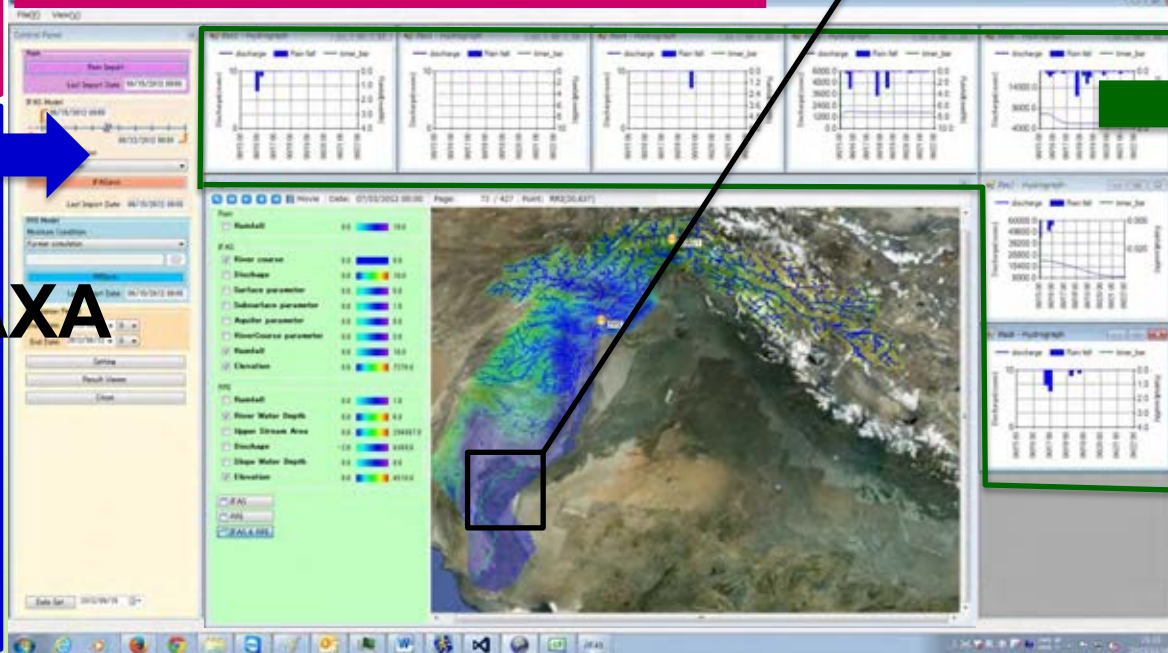


FLOOD HAZARD MAPPING

INPUT DATA:

- Rainfall data (ground-gauges, GSMaP, forecasted)
- Real-time observed discharges

JAXA



OUTPUT DATA:

- Rainfall distribution maps
- Hydrographs at specified locations
- Inundation extents in mid-low Indus

Capacity Building Programs in UNESCO Pakistan Project

(2012-)



6 Pakistani officers
graduating from
ICHARM/GRIPS
MSc

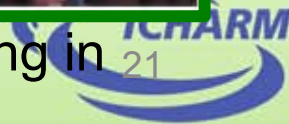


Short-training course in Japan of 11
Senior Managers from Pakistan



ICHARM participation to international
Workshop and Training in Pakistan

Indus-IFAS training in
Pakistan



2009.11-2013.3

Bangladesh: Whole Nation

- Review & recomm of Early Warning Systems
- Capacity building

Philippines: Pampanga & Cagayan basins

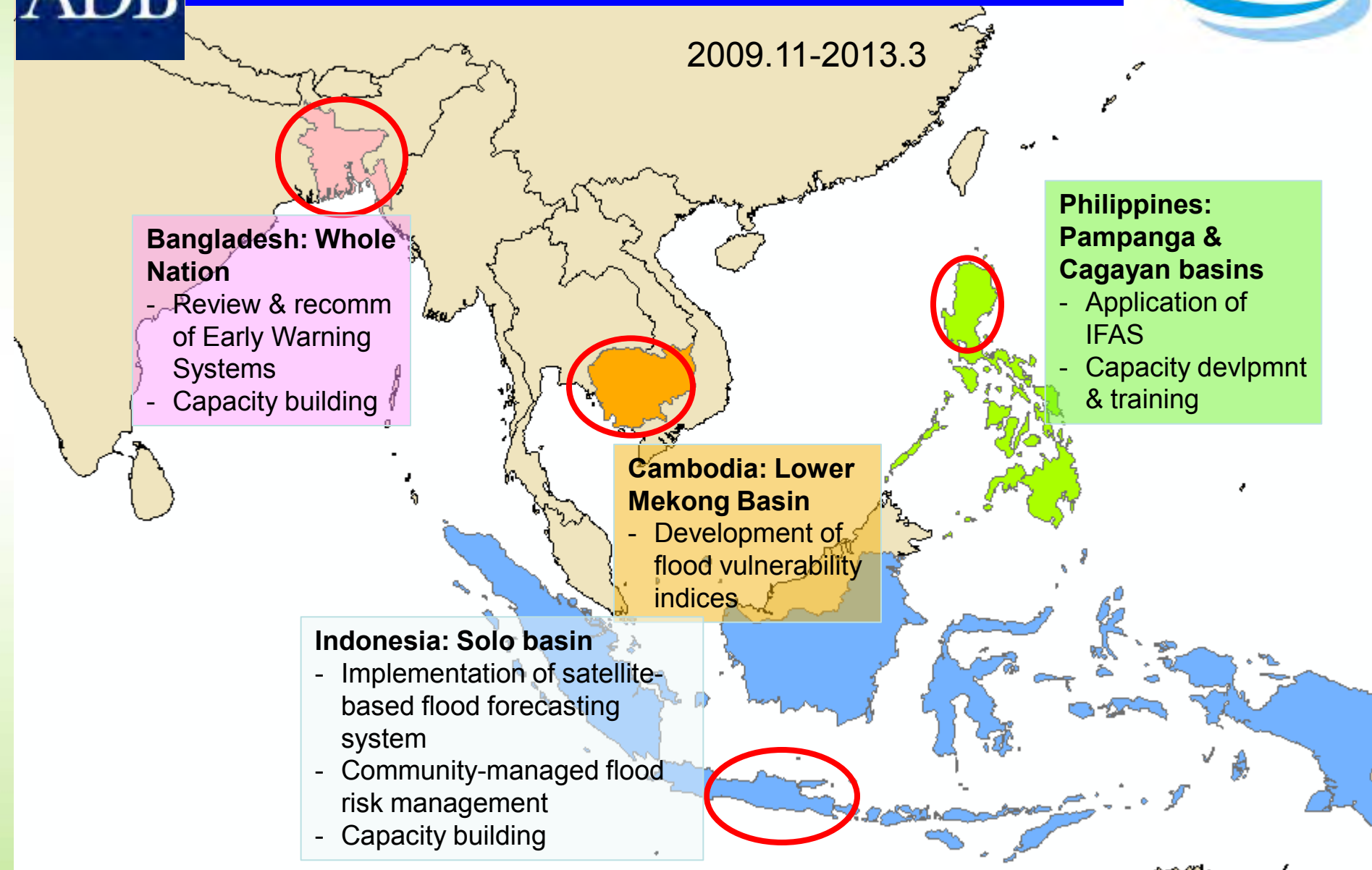
- Application of IFAS
- Capacity devlpmnt & training

Cambodia: Lower Mekong Basin

- Development of flood vulnerability indices

Indonesia: Solo basin

- Implementation of satellite-based flood forecasting system
- Community-managed flood risk management
- Capacity building



Flood Contingency Planning

Workshop at Barangays (2016.1)

Workshops for sharing results and discussing Barangay/Municipal Plan

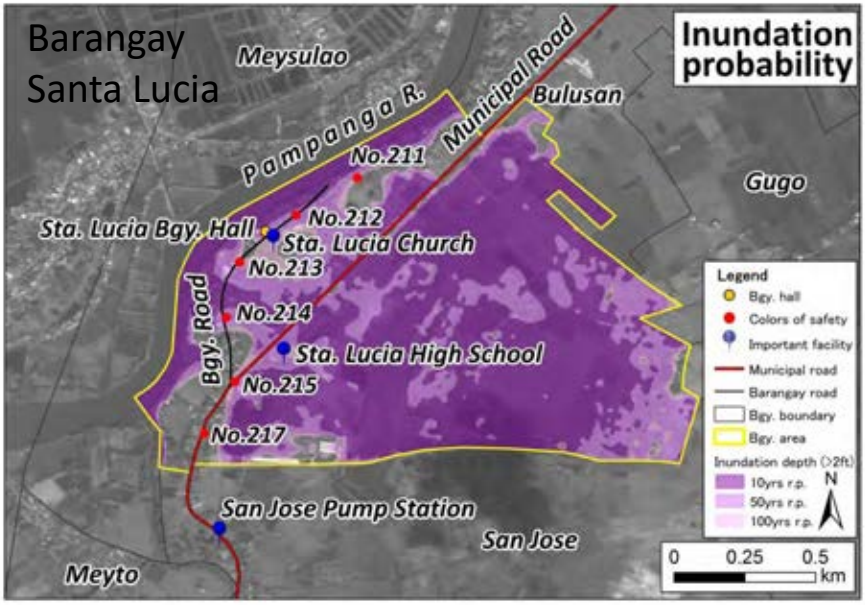
Workshop at Municipality (2015.2)



Explanation of scenario



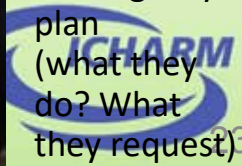
Discussion with local residents



Probability map of first flood inundation



Identification of necessary action for developing Barangay contingency plan (what they do? What they request?)



Information Networking

Alliance with Univ., Prof. Ass.,
UNOs, IOs, Gov., GOs, NGOs etc.

Tsukuba
Japan

27-29 September 2011

Floods: From Risk to Opportunities

5th International Conference on Flood Management

ICFM5

INTERNATIONAL
FLOOD
INITIATIVE

In close collaboration with:



IRDR
災害リスク
統合研究



Prevention and Action to Minimize
Death and Destruction
Building Resilience toward Sustainable Development



The High-Level Expert Panel on Water and
Disaster/UNSGAB (HLEP)

INTERNATIONAL FLOOD INITIATIVE

MISSION

The International Flood Initiative (IFI) promotes an integrated approach to flood management to take advantage of floods and use of flood plains while reducing the social, environmental and economic risks.

STATEMENT:

OVERALL

To build the capacity necessary to understand and better respond to flood hazards, vulnerabilities and benefits.

OBJECTIVE:

IFI's GUIDING PRINCIPLES:

Living with Floods

Equity

Empowered participation

Inter-disciplinarily and trans-sectorality.

www.ifi-home.info

**Initiated at UN Global
Conference for Disaster
Risk Reduction in Kobe,
January 2005**

In Close Collaboration with:



安きにありて危うきを思う

居安思危 Be aware of risk while we are safe

思えばすなわち備えあり

思則有備 Awareness leads us preparedness

備えあれば患いなし

有備無患 Preparedness leaves us no regret

「春秋」左氏伝

Source: Zuo Qiuming "Zuoshi Commentary"
in Confucius ed. "Spring and Autumn", 480BC

**ICHARM cares people's well-being
and human empowerment!**

www.icharm.pwri.go.jp



preparedness for floods

Global Precipitation Measurement (GPM)

Current Observation System:

TRMM and other orbital Satellites, and 5 Geostationary Satellites

Core Satellite

Dual Frequency Radar

Multi Frequency Radiometer

◇ Observation of rainfall with more accurate and higher resolution

◇ Adjustment of data from constellation satellites

JAXA (Japan)

Dual frequency Radar, Rocket

NASA(US)

Satellite Bus, Micro-wave gauging measurement



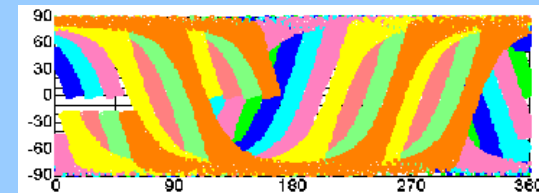
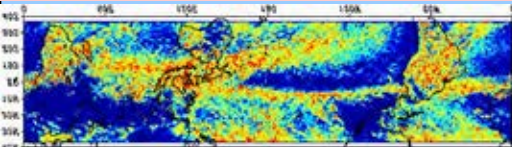
8 Constellation Satellites

Satellites with Micro-wave Radiometers

◇ More frequent Observation

Cooperation :

NOAA(US),NASA(US),ESA(EU), China, Korea and others



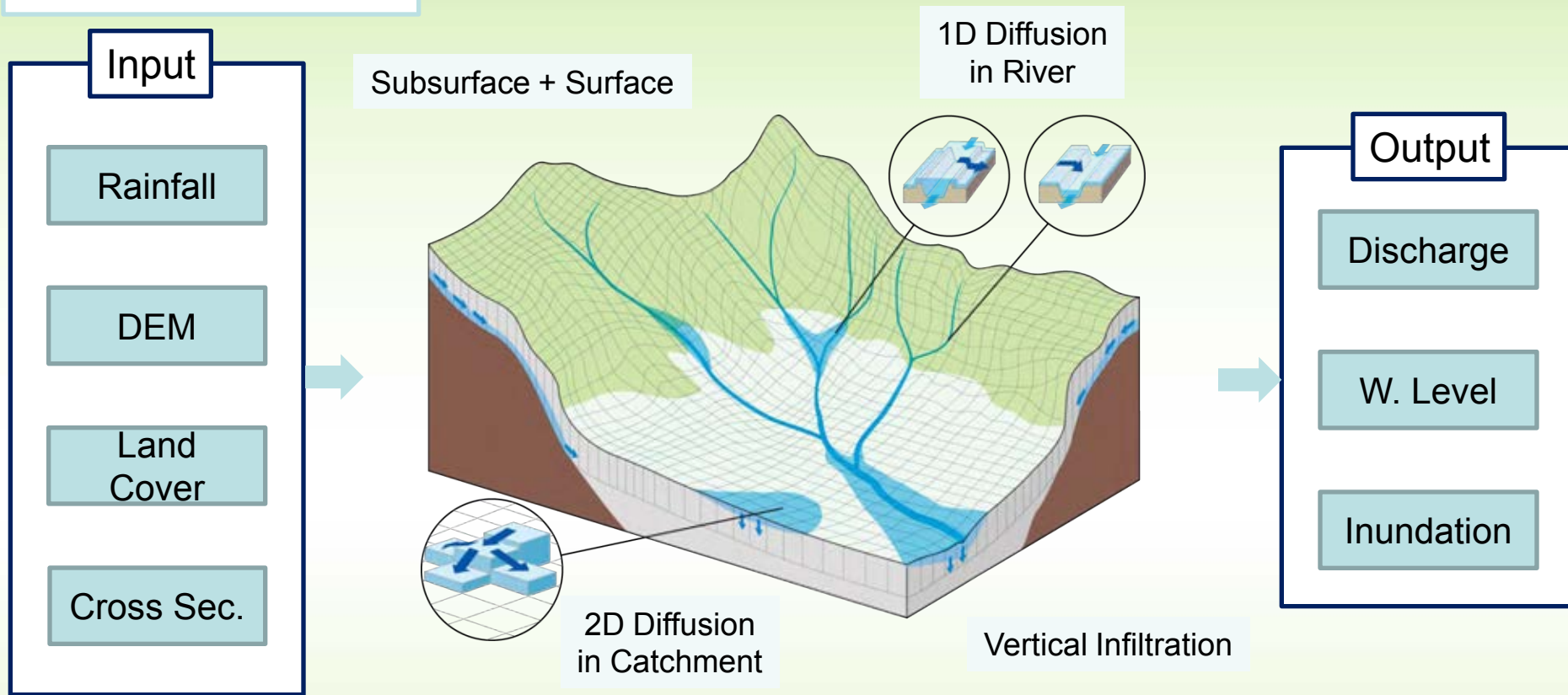
- Earth heating Phenomena
- Study of Climate Change
- Improvement of forecasting system

Global Observation every 3 hours

- IWRM
- Flood Forecasting
- Forecasting of crop productivity

Rainfall-Runoff-Inundation Model

RRI Model Structure



- Two-dimensional model capable of simulating **rainfall-runoff and flood inundation simultaneously**
- The model deals with slopes and river channels separately
- At a grid cell in which a river channel is located, the model assumes that both slope and river are positioned within the same grid cell

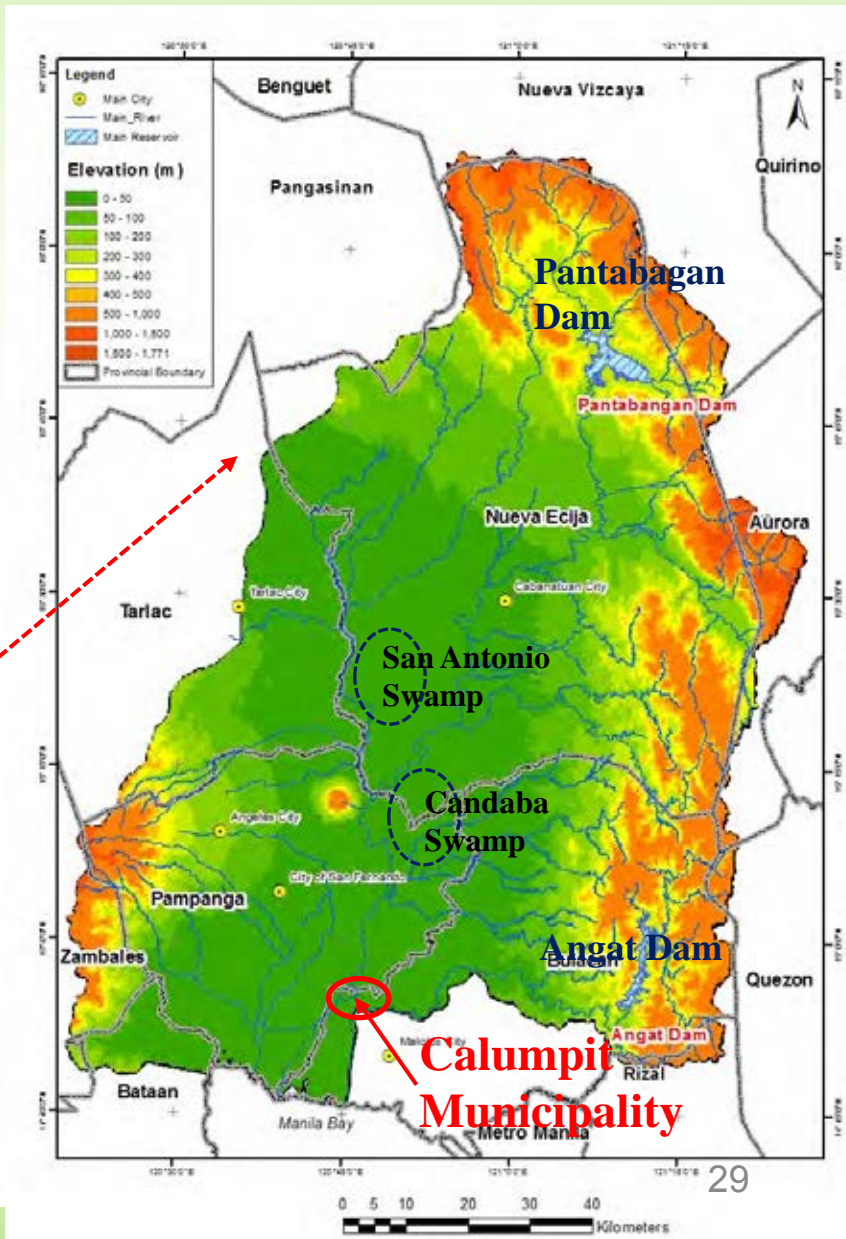
Case study in Pampanga River Basin

Outline of the basin



Forth largest river basin in the Philippines

- Catchment Area: 10,434 km²**
- River Length: 260 km**
- Average annual rainfall: 2155mm/year**
- Population: 6.58 million (based on national statistic 2010)**
- Population Density: 630 persons / km²**





UN WCDRR Sendai, 14-18 March 2015



Sendai Framework for Action: 7 global targets by 2020/30

(a) Substantially reduce global disaster mortality

(b) Substantially reduce the number of affected people

(c) Reduce direct disaster economic loss

(d) Substantially reduce disaster damage to critical infrastructure and basic services

(e) Substantially increase countries with DRR strategies

(f) Substantially enhance international cooperation to developing countries

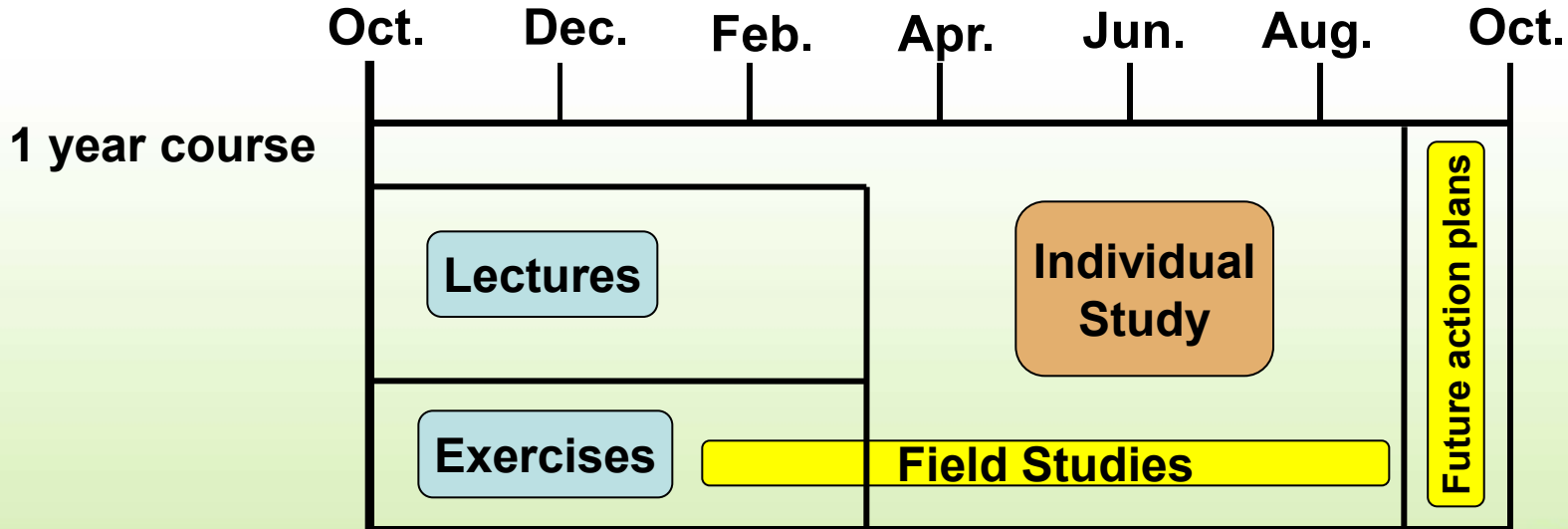
(g) Substantially increase early warning systems and risk assessments



Master Course on Water-related Disaster Management

with National Graduate Institute for Policy Studies (GRIPS)
supported by JICA since October 2007

- To foster **solution oriented practitioners** with solid theoretical and engineering bases who can serve for planning and implementation of flood management practices within the framework of integrated water resources management at national to local levels.



In 2015, 97 MS from 24 countries graduated. 13 MS from 10 countries students studying.

Governance

- Flood management is largely an issue of governance, not necessarily of science and technology or economy.
 - WMO mission to Myanmar right after the Nargis in May 2008 issued a press release saying “Cyclone warnings were sufficient. Deaths inevitable”. 138 000 died.
 - N Ambraseys and R Bilham “Corruption kills”, *Nature*, 13 Jan 2011
- ICHARM Master Course offers a **Sontoku-Award** since 2007: A student voted most by other students as one who served best for the benefit of the group rather than his/her own benefit.

Ninomiya Kinjiro Sontoku: Social reformer in agro-economy (1787-1856)



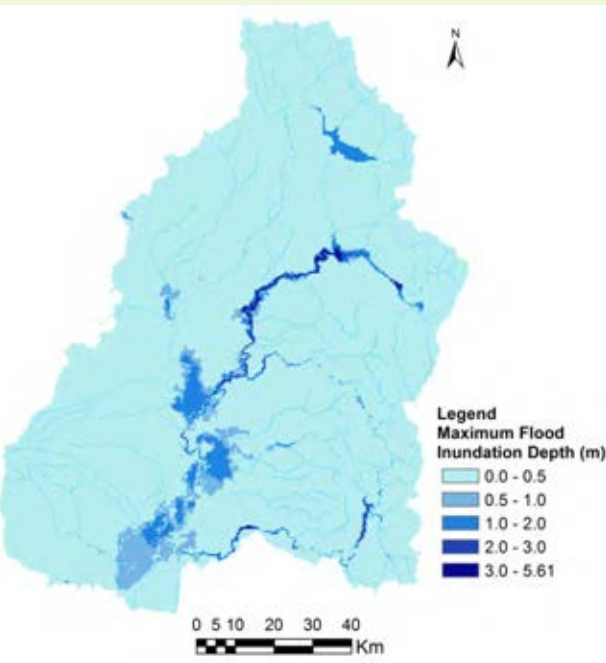
Flood Hazard Assessment in Pampanga River Basin

Flood Hazard Analysis by RRI Simulation

Different Flood Scale

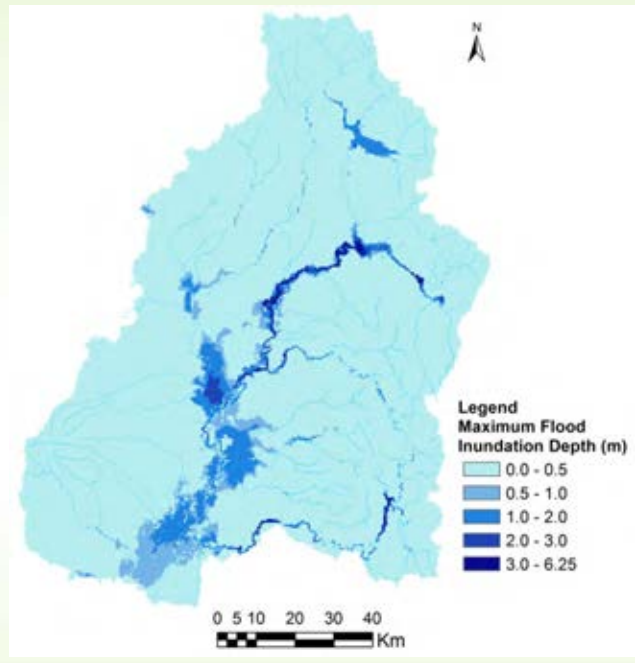
Maximum Inundation Depth

450m x 450m grid



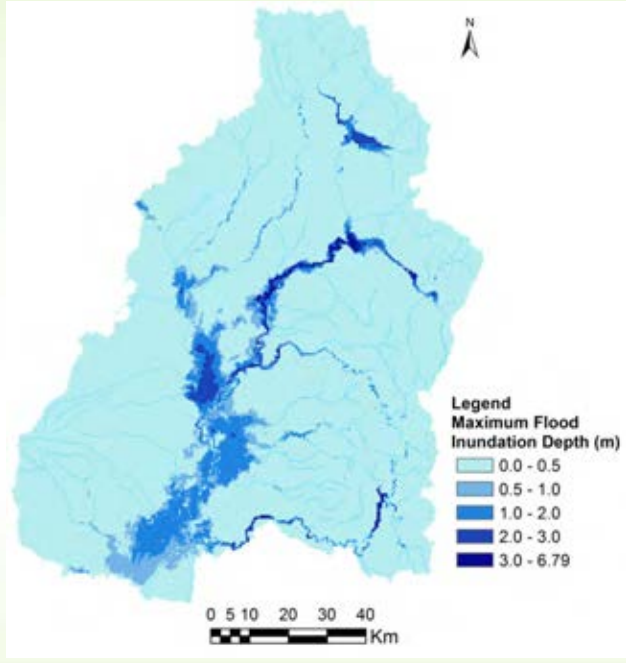
25-Year Flood

Inundated area (>0.5m depth)=
77,396 ha



50-Year Flood

Inundated area (>0.5m depth)=
103,376 ha



100-Year Flood

Inundated area (>0.5m depth)=
127,008 ha

Using IfSAR DEM

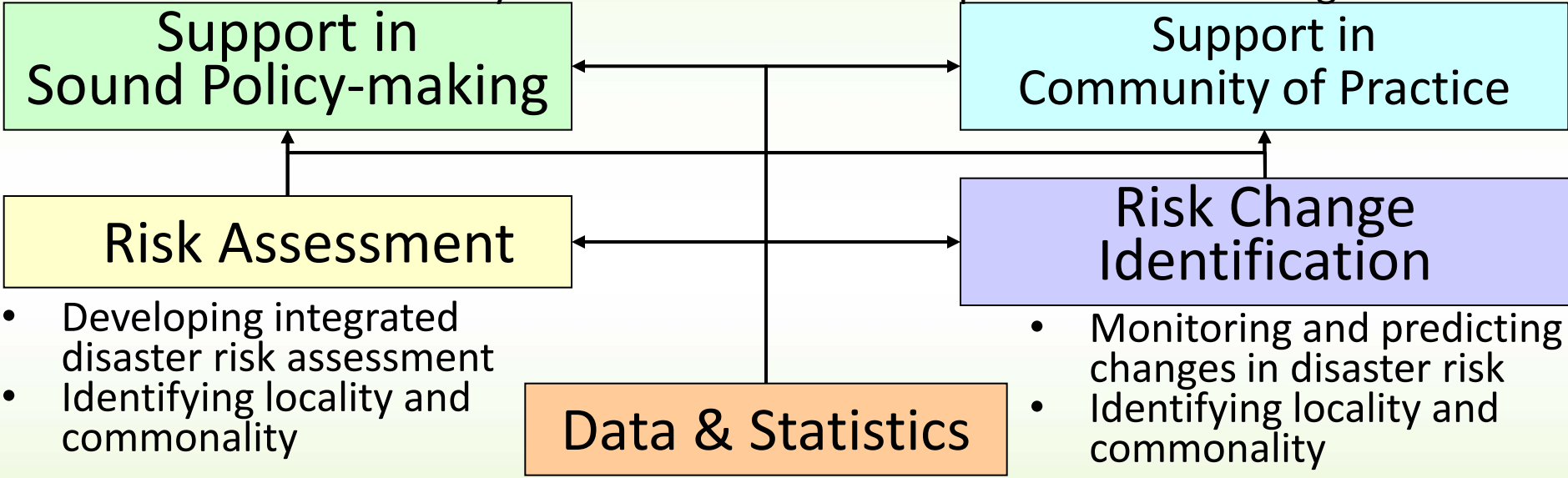
Interferometric Synthetic Aperture Radar (IfSAR) provided by National Mapping and Resource Information Authority (NAMRIA)



IFI Implementation Framework

- Analyzing and formulating policies
- Visualizing values of preparedness and investment efficiency

- Improving disaster literacy
- Promoting co-design and co-implementation among stakeholders



- Developing integrated disaster risk assessment
- Identifying locality and commonality
- Monitoring and predicting changes in disaster risk
- Identifying locality and commonality
- Promoting data collection, storage, sharing, and statistics
- Integrating local data, satellite observations and model outputs

Annex 6 - Report of ICWRER, Kyoto Japan



7th ICWRER

June 5-9, 2016 Kyoto, Japan

The 7th International Conference on Water Resources and Environment Research



This program is supported by a subsidy from Kyoto City and the Kyoto Convention & Visitors Bureau.

Scope of the Conference



The International Conference on Water Resources and Environment Research (ICWRER) is a series of conferences dealing with hydrology and water resources. ICWRER2016 was the 7th one of the series, and back to Kyoto since 1996 (1st one).

One of the objectives of ICWRER conferences is to bring together physical, biological, chemical, statistical and technical expertise in order to better understand natural systems related to water resources from all around the world.



Key figures

Number of participants: 237

International participants: 125 (32 countries)

Keynote lectures

- Eiichi Nakakita, DPRI, Kyoto University
- Hubert Savenije, Delft University of Technology
- Toshio Koike, University of Tokyo / ICHARM
- G. Mathias Kondolf, University of California Berkeley

Themes and Topics

- Theme 1: Climate change
- Theme 2: Hydrometeorological extreme events
- Theme 3: GIS and remote sensing in hydrology and water resources
- Theme 4: Surface water and ground water interaction
- Theme 5: Real-time hydrometeorological forecasting
- Theme 6: Water-related disasters
- Theme 7: Environmental management enhancing ecosystem services
- Theme 8: Integrated sediment and ecosystem management
- Theme 9: Water and environment management in urban areas
- Theme 10: Eco-hydraulics/ eco-hydrology for water sustainability
- Theme 11: Risk analysis and management
- Theme 12: Legislation systems for water management
- Theme 13: Water diplomacy
- Theme 14: Social and economic aspects in water resources
- Theme 15: Sustainable water resources management

UNESCO IHP-RSC, IDI, IFI special session at 7th ICWRER 2016: Regional delivery of SDGs a focus on Hydroinformatics and Education for Hydrohazards.

June 7 2016, Kyoto, Japan



Session Structure

- **Introduction:** IHP-VIII, SDGs, challenges for the region (Prof Khan, UNESCO Jakarta)
- **Presentation 1:** Current Institutional Arrangement of Water governance in the Philippines (Prof Tabios, IHP-RSC Chair)
- **Presentation 2:** Report of the proposal for making the Catalogues of Hydrologic Analysis as the successive series of the Catalogues of Rivers. (Prof Kobayashi, Prof Chikamori, Prof Tachikawa, IHP-RSC members)
- **Presentation 3:** IFI activities toward robustness for flood management in Asia and the Pacific region (Prof Koike, ICHARM)
- **Presentation 4:** Innovation Approaches for Drought Risk Prediction and Monitoring in the Arid and Semi-arid Areas of the West Asia (Prof Chavoshian, IDI)
- **Discussion**
- **Conclusion**

Objective of Session

To discuss and exchange views of the panellists on the following two questions:

1. What are the main challenges for Asia and the Pacific Region to achieve water security and hydrohazards resilience?
2. How IHP can play a role in delivering water related SDGs?

Both questions were answered focusing on the role of hydroinformatics and education for hydrohazards.

Discussion

- The importance of water governance needs to be enforced in efficient disaster risk reduction measures.
- The need for freely available statistical and hydrological analysis models or modules to build on the data collected such as in the Catalogue of Rivers in order to assess water-related disaster impacts in the region.
- The need of the start of a new IHP-RSC project, the Catalogue of Hydrological Analysis and call for contributions from the region not limited to IHP-RSC members, UNESCO Category II centres and Water Chairs in the region.
- The need to strengthen hydrohazards management capacity at the national level for other champion projects like the JICA funded UNESCO project in Pakistan “Strategic Strengthening of Flood Warning and Management Capacity of Pakistan” which can be showcased.
- The need for an online UNESCO catalogue of activities and trainings delivered in the region to strengthen hydrohazards management capacity at regional level.

Conclusions

- Strengthen hydroinformatics as a tool for hydrohazards vulnerability assessment:
 - Catalogue of Hydrological Analysis
 - IFI new strategy
 - IDI strategy
- Strengthen hydrohazard curricula linking science and policy from community to national level.

Mechanism for IHP-VIII, SDGs and Paris Agreement delivery for water secure Asia and the Pacific region



A new IHP-RSC project, the Catalogue of Hydrological Analysis

8th International Conference on Water Resources and Environment Research (ICWRER 2019)



Date & Location

- **Date**

June 9 to 13, 2019

- **Location**

Nanjing, Jiangsu Province, China

ICWRER 2019 Committee

(Suggestions, to be arranged later)

- **Chair of ICWRER 2019**

Jianyun Zhang (Nanjing Hydraulic Research Institute)

- **Chair of Steering Committee**

Keith. W. Hipel (University of Waterloo)

- **Chair of Local Organizing Committee**

Huimin Wang (Hohai University)

Sponsors



China Institute of Water
Resources and
Research



Systems engineering
society of China



Nanjing Hydraulic
Research Institute



Nanjing University of
Aeronautics
and Astronautics



Suzhou University
of Science
and Technology



United Nations
Educational, Scientific and
Cultural Organization

IHP- VIII 2014-2021



Japan
Funds-in-Trust

Water Security: Response to Global, Regional and Local Challenges



**Water
Related
Disasters
and
Hydrological
Changes**



**Groundwater
in a
Changing
Environment**



**Addressing
Water
Scarcity and
Quality**



**Water and
Human
Settlements
of the Future**



**Ecohydrology
Engineering
Harmony for
a Sustainable
World**



**Education,
Key to Water
Security**

Water Security, Addressing Local, Regional and Global Challenges

Sustainable Development Goals

Transforming our world: the 2030 Agenda for Sustainable Development



“This Agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom.”

17 Goals sub-divided in 169 targets.

[9 Goals for hydrohazards resilient region.](#)

<https://sustainabledevelopment.un.org/?menu=1300>



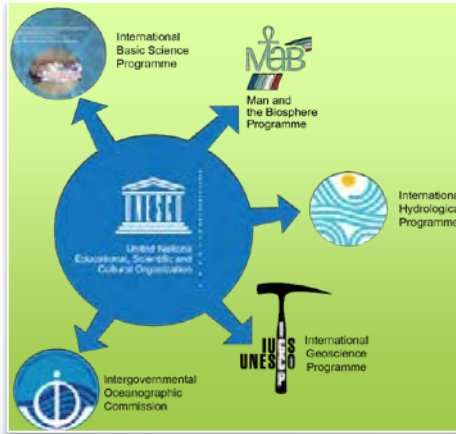
United Nations
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Cultural Organization

Natural Sciences Programmes

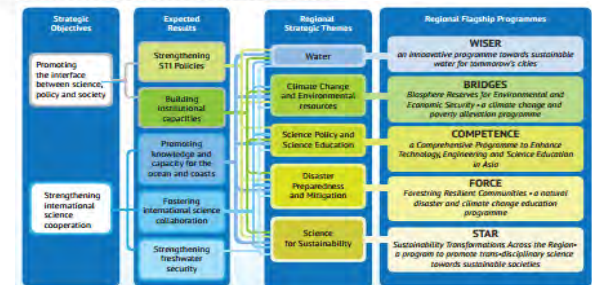
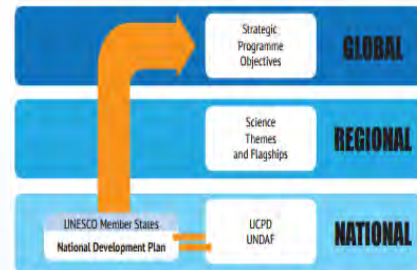


Japan
Funds-in-Trust

Deliver the 5 UNESCO's intergovernmental and international programs through
10 UNESCO's major Programmes, Initiatives and Bodies



Built on Regional Science Support Strategy



R&D, Capacity Building, Training, Networking, and
Policy Advice

Policy pointers identified by the UNESCO South-South modellers expert group (Jakarta, 31 August - 1 September 2015)

- 1) **Models are inevitable** in order to manage hydro-hazards. A dialogue between developers and users is required to achieve the co-design of fit-for-purpose models.
- 2) **All models are uncertain** but data quality for input, calibration and validation is essential. The access and exchange of hydro-meteorological, hydro-environmental, socio-economical, and damage related data from multiple sources (big data, social media based data, indigenous knowledge, local community experiences in coping or disaster responses) should be granted and facilitated at global, regional and national levels for non-commercial purposes.
- 3) **Transdisciplinary efforts of multidisciplinary cooperation in producing operational model outputs:** Modelling and eventually managing hydro-hazards is a transdisciplinary challenge. Multidisciplinary cooperation should be facilitated with integrative standardized frameworks including academia, professionals and public officers in charge of hydro-hazards management at global, regional, national and river basin levels.
- 4) **Modelling and managing hydro-hazards is both global and local matter. Trans-regional cooperation** should be encouraged with willingness reflected by relevant funding. Different UN platform and Initiative can be appropriate venues.

Annex 7 - The 26th IHP Nagoya Training Course



MEXT

MINISTRY OF EDUCATION,
CULTURE, SPORTS,
SCIENCE AND TECHNOLOGY (JAPAN)

The 26th IHP Training Course:

Coastal Vulnerability and Freshwater Discharge



ISEE, Nagoya University, Japan,
27 Nov. – 10 Dec., 2016

Background of the TC

Large amount of materials are discharged to the coastal water with the freshwater, and they played important roles to keep the coastal ecosystem; however, the pollution of the freshwater also alternate the coastal ecosystem.

Those freshwater discharges are also changing significantly by the climate change, construction of dams on the river, and use of freshwater. Coastal shallow area is often destructed to make a land for farming, industry or living area with reclamation and other human activities.

It is necessary to manage the area to make comfortable, productive and safe.

Objectives:

In light of the **THEME 3: Addressing Water Scarcity and Quality**, **THEME 4: Water and Human Settlements of the Future** and **THEME 5: Ecohydrology, Engineering Harmony for a Sustainable World** of the IHP-VIII, the 26th IHP training course is focused on major objectives:

- (1) the basic knowledge of physical, biological and chemical environments of coastal waters, and forcing including freshwaters from river and underground discharge; and
- (2) interaction between nature of coastal area and human.

Dates:

27 November to 10 December, 2016

Venue:

Institute for Space-Earth Environmental Research (ISEE),
Nagoya University

Program

Key Note Lectures

K1: <i>Satoumi</i> Concept	Nov. 29 pm	YANAGI T.
K2: Melting Tibetan Ice Shield	Nov. 30 pm	CHEN A.

Lectures

L1: River Discharge	Nov. 28 am	TANAKA K.
L2: Submarine Ground Water Discharge	Nov. 28 pm	TANIGUCHI M.
L3: Coastal Water Circulation	Nov. 29 am	KASAI A.
L4: Nutrient Dynamics	Nov. 30 am	UMEZAWA Y.
L5: Plankton Ecosystem	Dec. 5 am	ISHIZAKA J.
L6: Influence to Fisheries	Dec. 6 am	ISHIKAWA S.
L7: Tsunami and Disaster Prevention	Dec. 7 am	TOMITA, T.
L8: Tidal Flat Conservation	Dec. 8 am	YAMASHITA H.

Exercise

E1: Satellite Data Analysis	Dec. 5 pm	TERAUCHI G.
E2: Cruise Data Analysis	Dec. 6 pm	ISHIZAKA J.
E3: Coastal Model Output Analysis	Dec. 7 pm	AIKI H.

Field Workshop and Exercise

W1: Cruise in Ise Bay by T/V Seisui-Marun, Mie University	ISHIZAKA J., AIKI, H., and MINO Y.	
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Downloading the Textbook for Internet Participants:

The textbook of “the 26th IHP Training Course”, which is converted in PDF style, will be prepared and be put on the IHP Nagoya/Kyoto forum website of “www.ihpnagoyaforum.org”. The participants are requested to download the PDF file from the website in advance as a preparation to the lectures of the training course. The textbook will include one page abstracts and presentation materials of the lectures.

Contact:

Convener : Prof. ISHIZAKA, Joji
Assistant : Assoc. Prof. AIKI, Hidenori
 Assist. Prof. MINO, Yoshihisa
 Assist. Prof. TOMITA, Hiroyuki
Secretary : Ms. HAGA, Saori
 Ms. NIIZUMA, Ryoko

Institute for Space-Earth Environmental Research (ISEE), Nagoya University

Annex 8, 9, 10, & 11 -
Updates on Catalogue of Hydrologic Analysis
modules and any other issues

MAB & IGGP

In the East Asian Subregion

Hans Dencker Thulstrup, UNESCO Office in Beijing
24th meeting of the IHP Regional Steering Committee
For Southeast Asia and the Pacific
Ulaanbaatar, Mongolia, 24 October 2016



United Nations
Educational, Scientific and
Cultural Organization



UNESCO
Global
Geoparks



United Nations
Educational, Scientific and
Cultural Organization
联合国教育、
科学及文化组织





What are Biosphere Reserves ... ?

669 UNESCO-designated places distributed on all continents, representing the **harmonious integration of people and nature for sustainable development.**

Special places for testing interdisciplinary approaches to understanding and managing changes and interactions between social and ecological systems, including conflict prevention and management of biodiversity.

In biosphere reserves, local communities, farmers, businesses, governments, protected area managers, researchers, teachers and students **work together to identify and promote best practices for sustainable development** that recognize the interdependence of nature and people.

From farmland to forests, from cities to coastlines, from mountains to marine areas: **biosphere reserves are places where people live with and interact with nature.**

China is home to 33 international biosphere reserves, including Changbaishan.

Among the world's first and most active subregional MAB networks

Seven member countries:

China

Democratic People's Republic of Korea (DPRK)

Japan

Kazakhstan

Mongolia

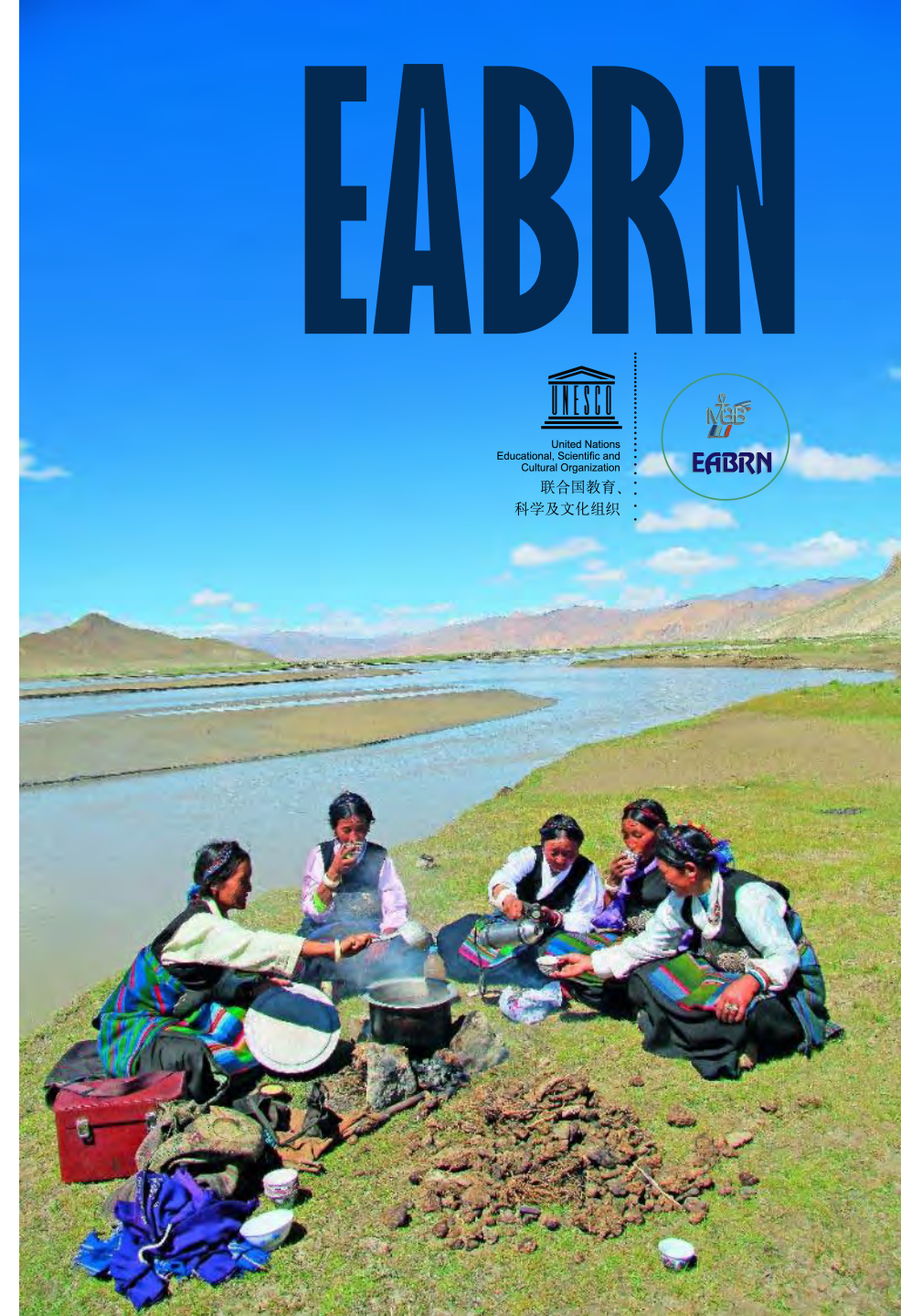
Republic of Korea

Russian Federation

Secretariat at the UNESCO Beijing Office since 2003

Supported by the Republic of Korea since inception

- Facilitates exchange of information between biosphere reserves
- Conducts regular regional meetings on issues of common concern
- Promotes training and site-to-site cooperation





...a year of achievements:

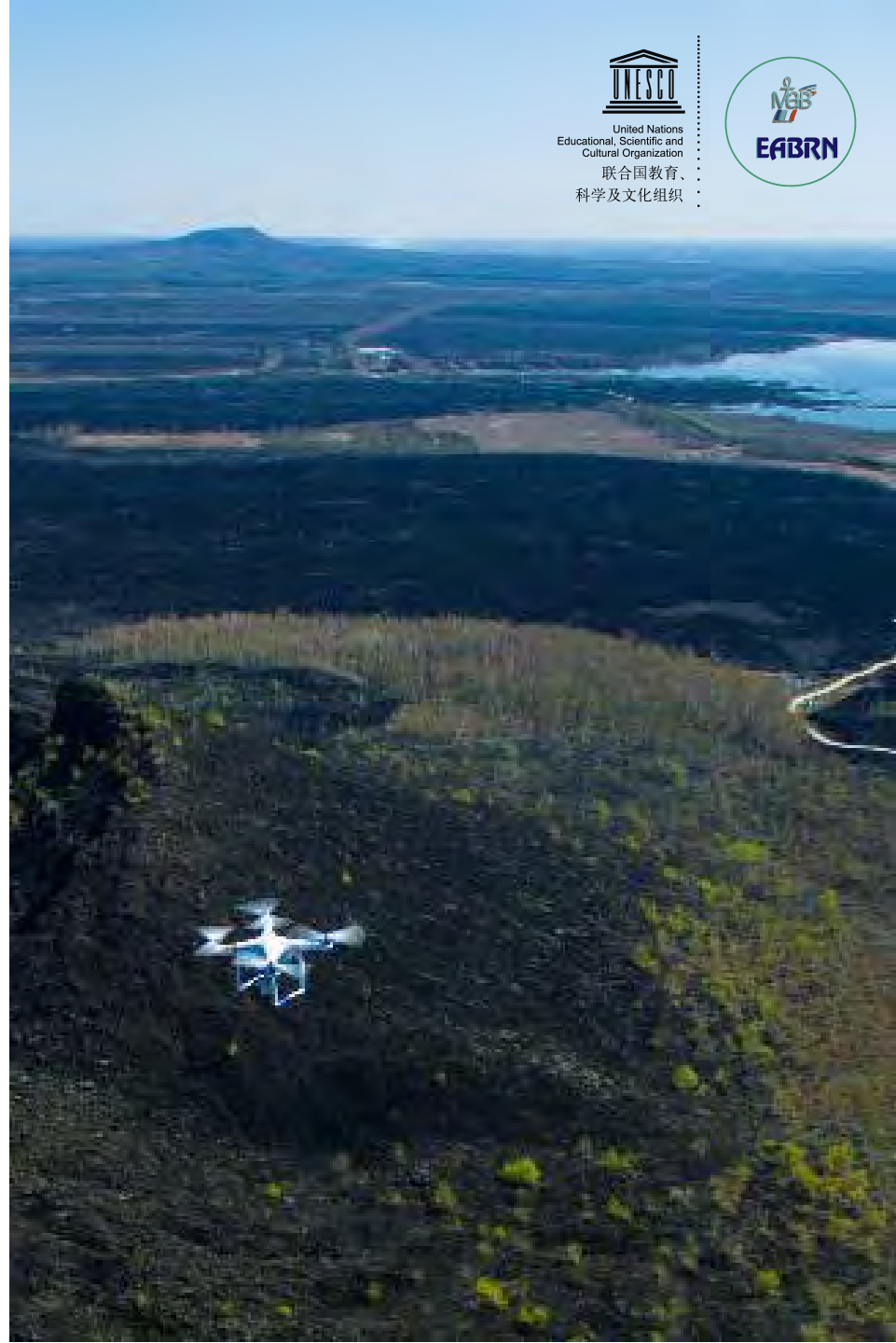
- **May 2015:** Biggest-ever EABRN training course, co-financed by Wudalianchi Biosphere Reserve Management Committee and the HIST Category 2 Centre
- **October 2015:** 14th network meeting:
 - Co-financed by Nagano and Yamanouchi
 - Joint session with JBRN
 - Evaluation of past 15 years of implementation
 - Identification of priorities for coming decade
 - Revision and updating of EABRN statutes
 - EABRN 20 years old!
- Two field evaluations: Wudalianchi (China) and Shiga Highland (Japan)
- **March 2016:** All seven network member countries contributed to EABRN workshop at the 4th World Congress of Biosphere Reserves
- Completion of Red Data Books for plants and animals for DPRK

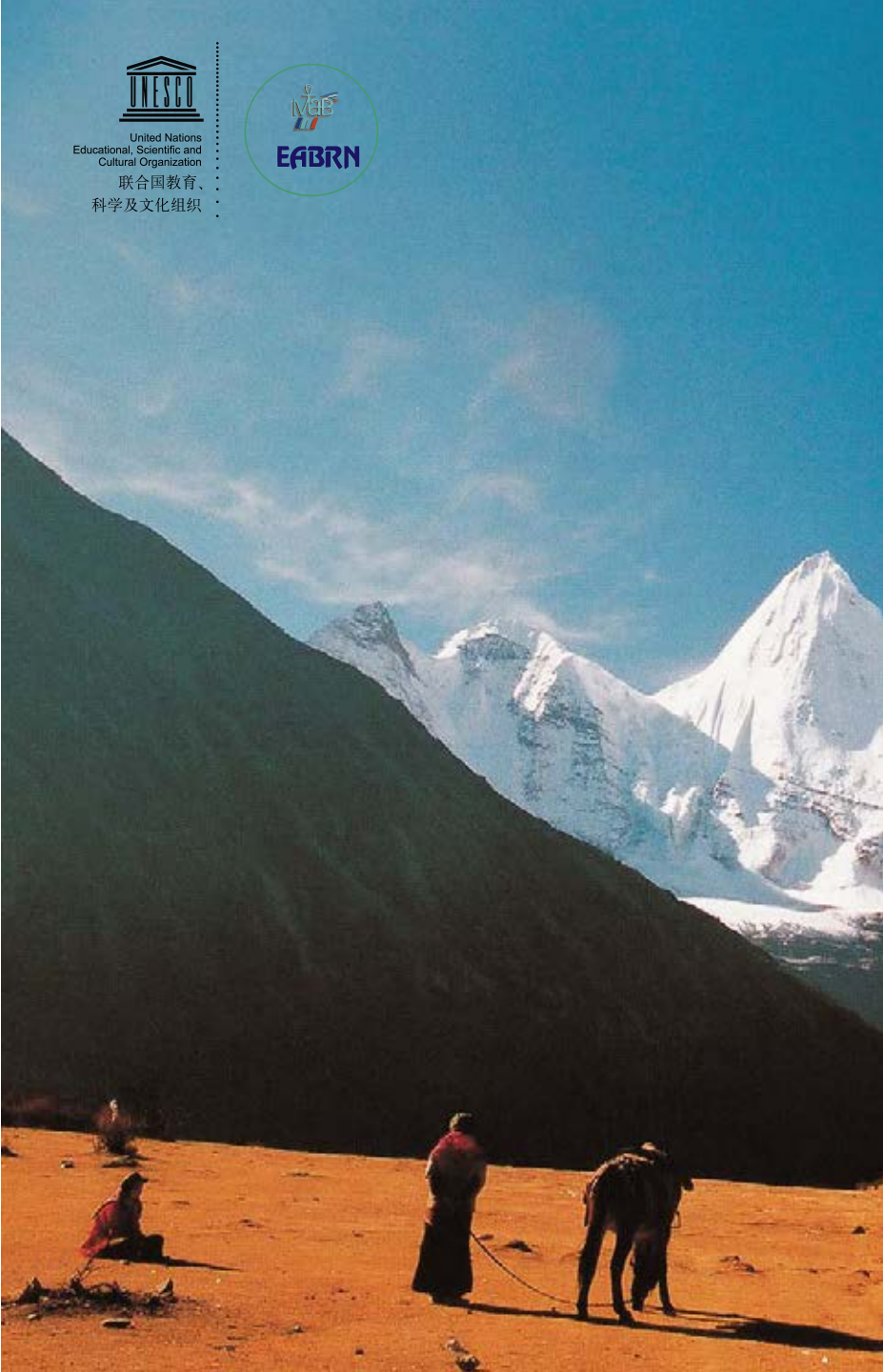


The East Asian Biosphere Reserve Network

EABRN priorities for 2016-2025

- Expand **joint research**
- **Engage multiple BRs in river basin-scale research projects**
- Continue and expand **training course activities**
- Focus on **site-to-site cooperation, exchange and visits**, targeting 10 site-to-site joint/integrated projects
- **Promote young scientists** in EABRN BRs, nominate members for MAB awards
- **Improve network modalities and structures** nationally as well as regionally
- Engage UNESCO Associated Schools for more **education activities** in BRs
- Contribute to initiatives linking biodiversity and sustainable development drawing BR **local/indigenous traditions, culture and knowledge**
- Identify **best practices for BR management** in other MAB regional networks and other types of protected areas
- Increase **networking and partnerships** between EABRN Member states and other regional Networks (SeaBRnet, SACAM, PacMAB)



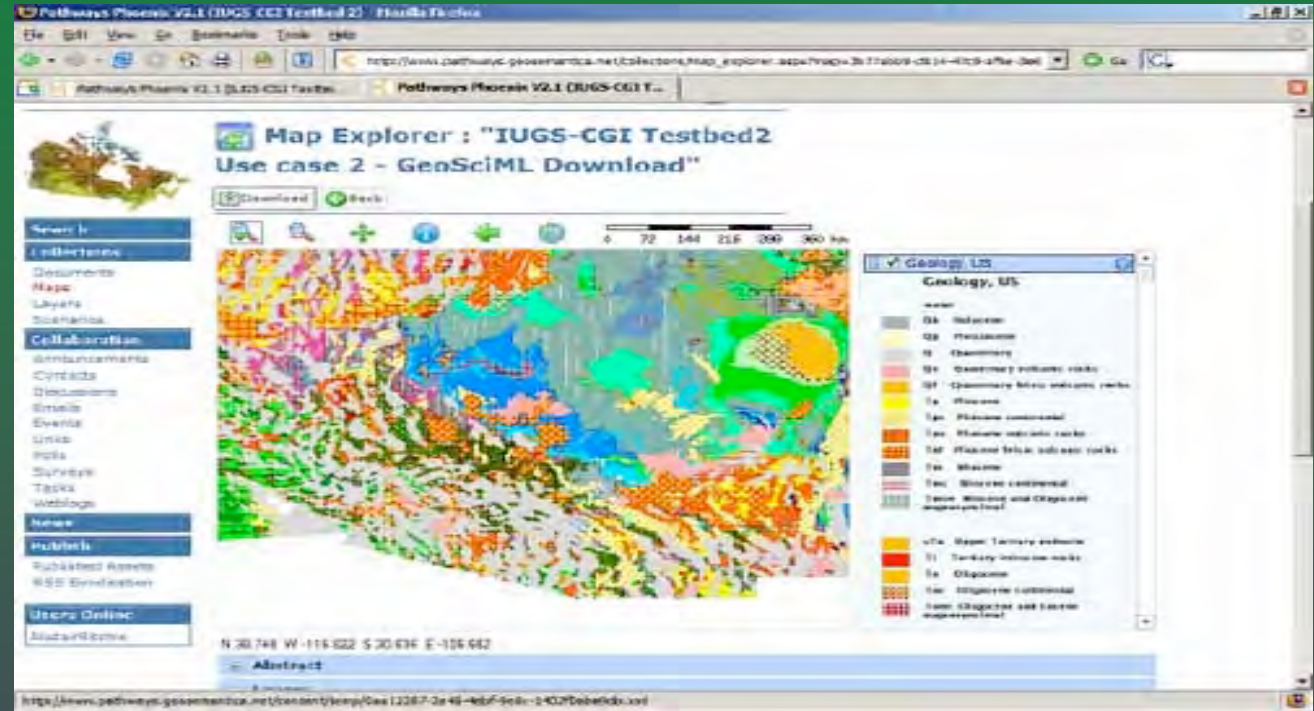


Next steps

- **7th EABRN training course:** new modality with member states/BRs contributing their particular expertise for a longer and more comprehensive training experience – integrating site-to-site cooperation and visits
 - First component organized by Republic of Korea late 2016 or early 2017
- **15th EABRN meeting:** Kazakhstan, 2017

International Geoscience and Geoparks Programme (IGGP)

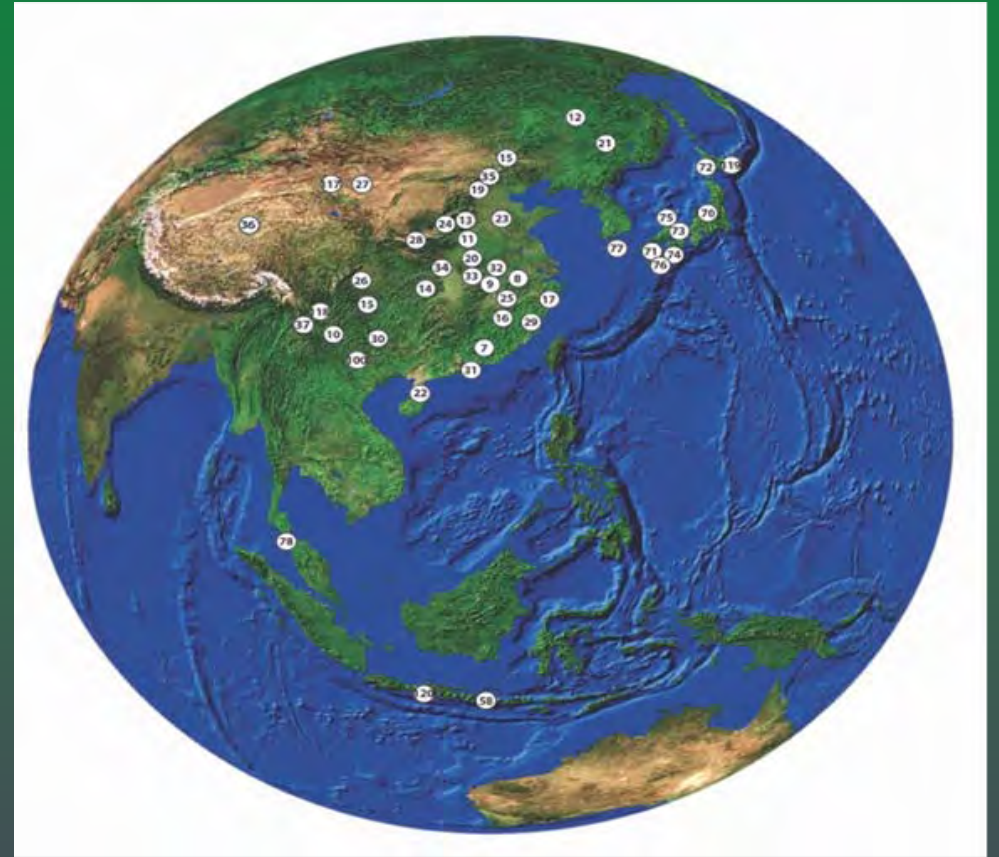
- The IGCP - the International Geoscience Programme has been UNESCO's flagship activity in Earth Science since 1972.
- It allows trans-national cooperation in Earth Science research in areas of societal relevance.
- The creation of **International Geoscience and Geoparks Programme** the new IGGP - (and, through it, the UNESCO Global Geopark designation) has allowed for a re-launching of the IGCP.
- The new Bureaux of both programmes - IGCP and UNESCO Global Geoparks will allow for cooperation and an exploration of synergies between the two.



OneGeology: IGCP 624

International Geoscience and Geoparks Programme (IGGP)

- Supports SDG 1, 6, 8, 9, 12, 13 & 17
- 120 UNESCO Global Geoparks in 33 countries
- Single, unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education and sustainable development.



UNESCO Global Geoparks

IS A GEOPARK JUST ABOUT GEOLOGY?

No! While a geopark must demonstrate geological heritage of international significance, the purpose of a geopark is to explore, develop and celebrate the links between that geological heritage and all other aspects of the areas natural, cultural and intangible heritages.



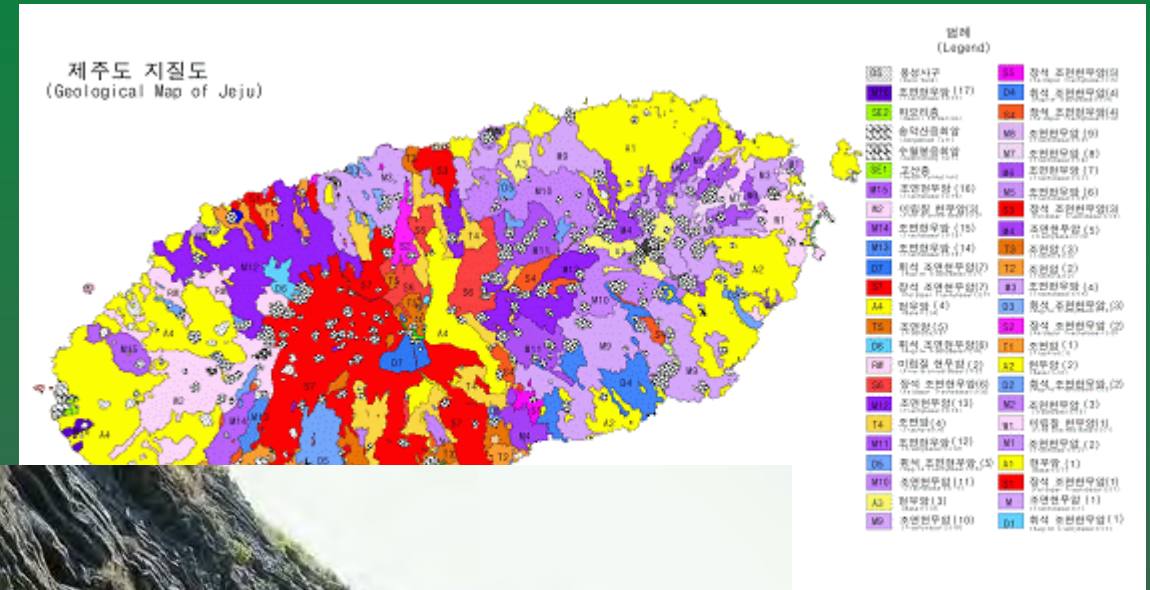
Zhanjiajie, China



Geopháirceanna
Domhanda
UNESCO

UNESCO Global Geoparks in East Asia: quick status

- China: 33 UNESCO Global Geoparks – founding member of GGN, annual meeting, international training courses (January, November 2016), active national network
- Japan: 8 UNESCO Global Geoparks, active national network
- Republic of Korea: Jeju Island – triple UNESCO designation (UGG, BR and WH)
- DPR Korea: UGG potential
- Mongolia: interest in developing UGG



Organisation
des Nations Unies
pour l'éducation,
la science et la culture

Géoparc
mondiaux
UNESCO

**Thank
you**



Global Runoff Data Centre (GRDC) and the GEMStat International database on water quality

24th IHP-Regional Steering Committee Meeting
in conjunction with the
International and national water dialogue on the delivery of SDG 6 in
Mongolia and wider Asia and the Pacific region
24 – 26 October 2016
Ulaanbaatar, Mongolia

Ulrich Looser (looser@bafg.de)

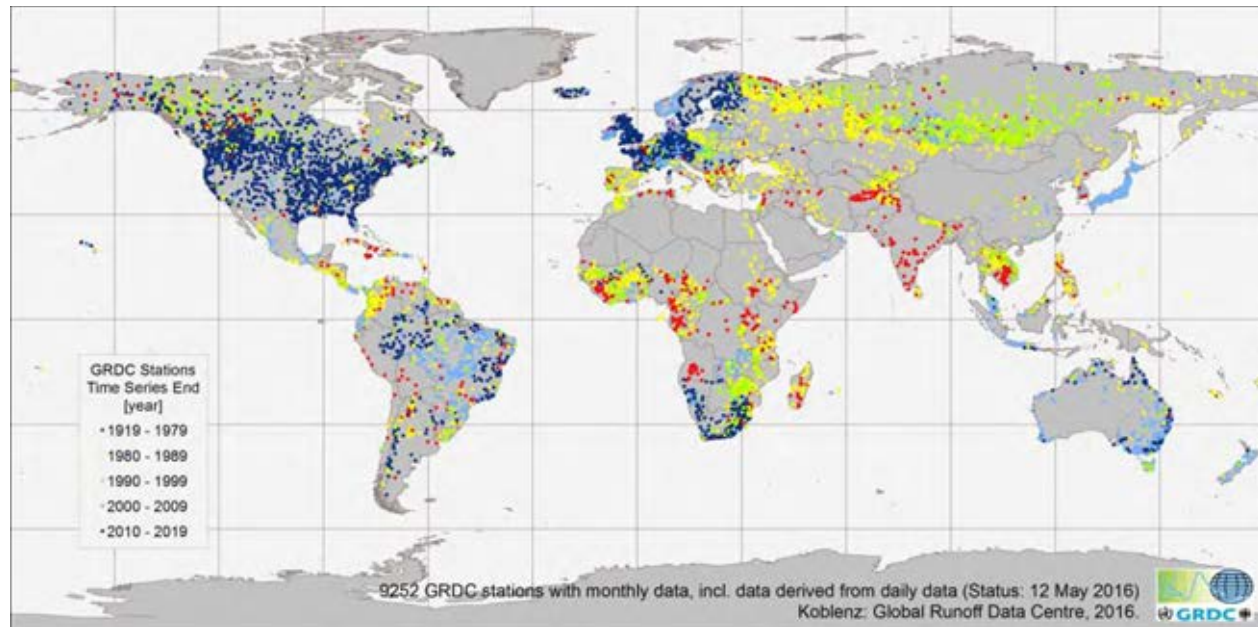


Global Runoff Data Centre GRDC



Acquisition global historical discharge data and associated metadata
GRDC fully depends on the cooperation and support of the National Hydrological Services of WMO member states for the supply of data

Dissemination of historical discharge data from 160 countries
More than 9200 stations, 400 000 station years, average record length 42 years



Support to the water and climate related international research community (including teaching) on water resources assessment, global change and climate services





ICWRGCG

Category 2 centre in Koblenz



United Nations
Educational, Scientific and
Cultural Organization

International Centre
for Water Resources and Global Change
under the auspices of UNESCO

**International Centre for Water Resources
and Global Change, Koblenz**

Siegfried Demuth

www.waterandchange.org



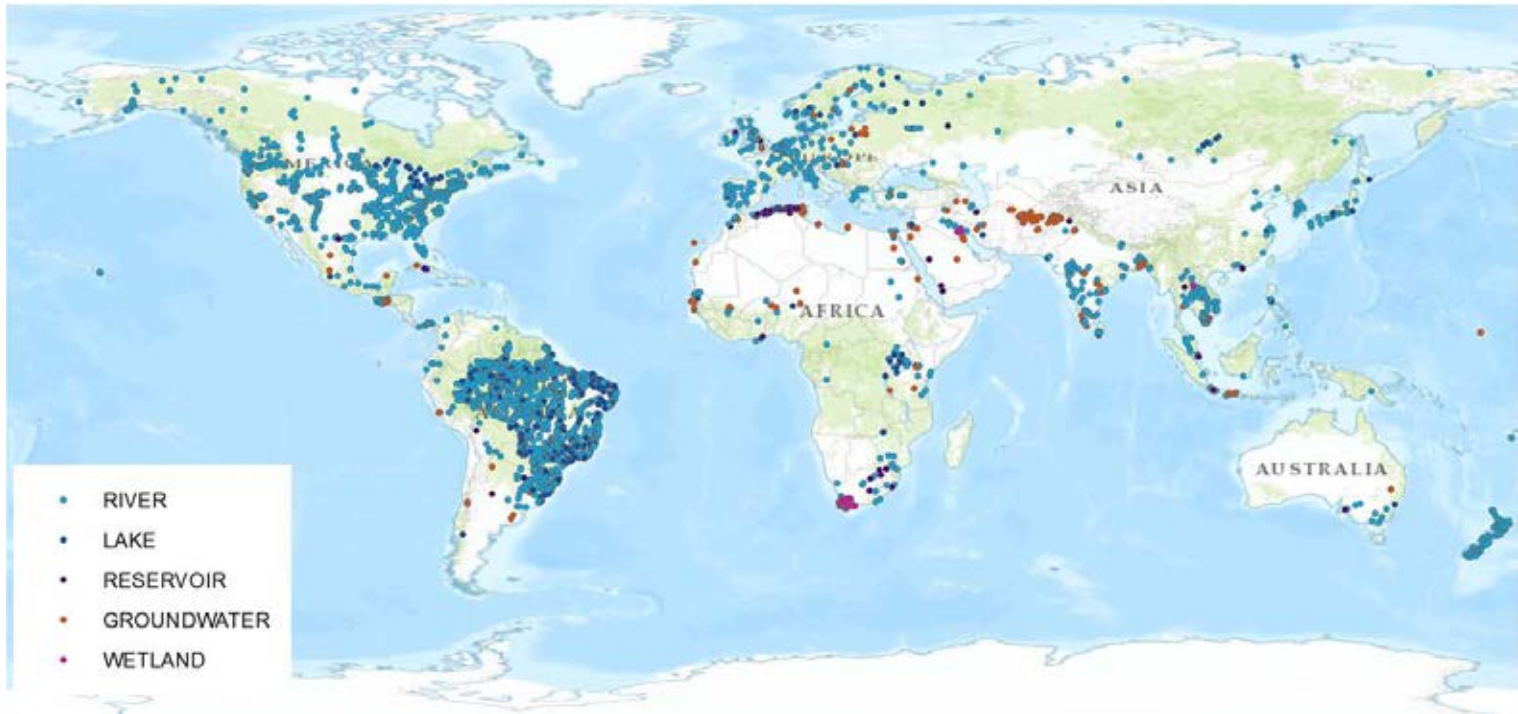


ICWRGCG hosts GEMStat water quality data base



Global collection of water quality data from National Authorities

Assessment and reporting on global state of water quality





GRDC link to WMO



GRDC operates under the auspices of the World Meteorological Organization (WMO)

15th meeting of Technical Commission on Hydrology (CHy) from 7 to 13 December 2016, Rom, Italy

<http://meetings.wmo.int/CHy-15>

Good opportunity for GRDC to liaise with representatives of National Hydrological Services

Request to IHP RSC members: Encourage National WMO representatives (Hydrological Advisors) to participate at Chy-15 and support GRDC and GEMStat





Global Runoff Data Centre Koblenz, Germany

...more than 27 Years GRDC



Thank you for your attention!

Please visit GRDC at
<http://grdc.bafg.de>

The GRDC at your service:

grdc@bafg.de

Tel: +49-261-1306-5224
Fax: +49-261-1306-5722

Am Mainzer Tor 1
D-56068 Koblenz



[DRAFT] APPRECIATION OF THE EFFORT INVOLVED IN THE 7th WORLD WATER FORUM

The 7th World Water Forum held in Daegu and Gyeongbuk Korea from 12-17 April 2015 was a major international water event attracting record participation and global attention. Hosted within the South East Asia-Pacific (SEAP) Region it showcased the challenges and the expertise in the region. The IHP Regional Steering Committee for SEAP express their great appreciation to all members of the UNESCO water family and especially the Korean IHP Committee and the IHP Secretariat for their efforts in highlighting IHP's contributions to the sector and for their enthusiastic participation in the 7th World Water Forum.

**[DRAFT] Resolution for
RUNOFF DATA ARCHIVES**

The Regional Steering Committee (RSC) for Southeast Asia and the Pacific (SEAP) of the International Hydrological Programme (IHP) of UNESCO,

Highlighting the regional activities of Catalogue of Rivers and Asian Pacific FRIEND which have been contributing to regional collaboration making use of various data on river basins since the latter half of 1990's,

Noting that data collection in recent years in the region has been inadequate

Further noting that the implementation of IHP's objectives, in light of mounting water-challenges, necessitates systematic collection and exchange of hydrological data, especially runoff data in rivers of the world,

Considering the offer of the Global Runoff Data Centre (GRDC) to host runoff data of the UNESCO FRIEND-Water programmes and make it available to the academic and water management communities,

Recognizing the right of Governments to choose the manner by which, and the extent to which, they make hydrological data available regionally and internationally,

Further recognizing the existence and continued application of data sharing policies, in particular those of the World Meteorological Organization (WMO),

Recommends that member states provide hydrological data to the Asian Pacific FRIEND Water Archive and to GRDC for further development of hydrological research and education,

Further recommends that the RSC SEAP of the IHP negotiates a MoU with the GRDC for the enhanced sharing of river discharge data and its metadata between the Asian Pacific FRIEND Water Archive and the GRDC, with the aim to foster contributions to global activities encouraging further development of hydrological research and education.

DRAFT-QUALIFICATIONS FOR FILLING VACANT CORE STAFF POSITIONS IN THE SECRETARIAT OF UNESCO'S INTERNATIONAL HYDROLOGICAL PROGRAMME

The Regional Steering Committee (RSC) for South East-Asia Pacific (SEAP) of the International Hydrological Programme (IHP) of UNESCO,

Recalling its role since 1993 to report, evaluate and review various activities carried out within the framework of IHP, to provide training opportunities, as well as to share information and experiences through annual conferences and meetings and to design and coordinate new initiatives,

Greatly valuing the support given to regional activities by the member nations of RSC, UNESCO Office in Jakarta and the IHP Secretariat, the UNESCO Jakarta Office, the UNESCO IHP Secretariat Paris and Government of Japan,

Noting that Water is a vital resource for human health, prosperity and social inclusion and global targets for sustainable development post 2015,

Further noting that the increasing challenges in the water and sanitation sector are both broad and complex, multidisciplinary and involve impacts of global change,

Noting with appreciation that Main Line of Action 6 on Water was identified amongst the highest budgetary priorities for Major Programme II on Natural Sciences by the 5th special session of the Executive Board and the 37th session of the General Conference,

Highlighting the long-term commitment over 40 years that UNESCO's Member States have already invested in making IHP a key player globally in addressing the highest priority issues relating to water,

Noting with alarm the number of vacant core positions in IHP Secretariat and the consequent increasing work load this places on remaining staff,

Further noting that the implementation of IHP's objectives, in light of mounting water-challenges, necessitates attracting and retaining highly qualified, experienced and motivated staff,

Requests the Director-General ensure that staff recruited to UNESCO IHP vacant core positions be highly appropriate qualified (PhD level) in hydrology candidates with the required experience and expertise to address the mounting global challenges in the water and sanitation sector,

Draft Resolution (submitted by Australia)

REPORTING OF CATEGORY II CENTRES AND UNESCO WATER CHAIRS TO UNESCO IHP INTERGOVERNMENTAL COUNCIL

The IHP Regional Steering Committee for Southeast Asia and the Pacific

Acknowledging	The vital contributions of UNESCO Category II Centres and UNESCO Water Chairs to UNESCO's Water family and to UNESCO IHP's work programme
Recognising	The prestige accompanying the awarding of the UNESCO brand to Category II Centres and water chairs
Noting with concern	Some Category II Centres and Water Chairs failed to report to the 22 nd Session of UNESCO IHP's Intergovernmental Council
Further Noting	The difficulty failure to report imposes in assessing the outcomes and progress of UNESCO IHP in fulfilling its mandate and the damage this does to UNESCO's reputation as an efficient organisation
Encourages	All Category II Centres and UNESCO Water Chairs within Region IV, Asia-Pacific to report on activities to IHP Secretariat prior to IHP Council meetings and RSC meetings
Mindful that	UNESCO General Conference sets the terms and conditions for Category II Centres and UNESCO Chairs
Encourages	All UNESCO country delegations within Region IV to consider making regular reporting of UNESCO Category II Centres and UNESCO Chairs a mandatory requirement for continuing the award of the UNESCO Brand
Requests	The Bureau of UNESCO IHP consider how mandatory reporting can be introduced as a requirement for continuing to bestow the prestigious brand of UNESCO on Category II Centres and Water Chairs and raise the issue within UNESCO



Main Issues, Challenges and Progress on Water Issues in the Asia-Pacific Issue

the international and national water dialogue on the delivery of SDG 6 in Mongolia and wider Asia and the Pacific region 24-26 October 2016, Ulaanbaatar Mongolia



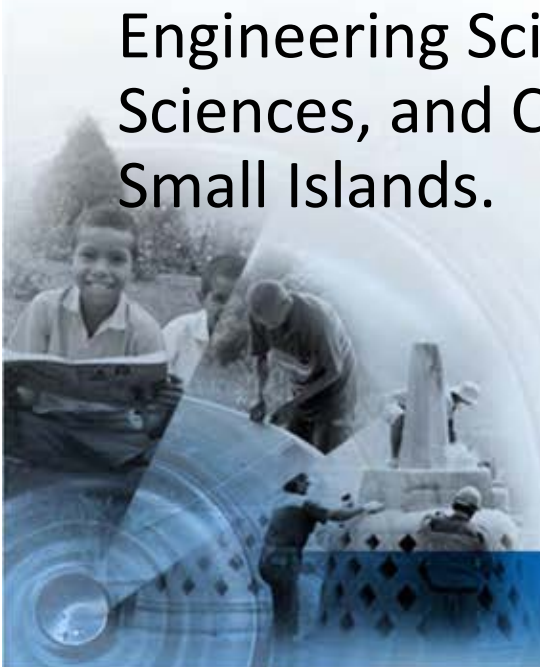
Japan
Funds-in-Trust





Regional Science Bureau for Asia and the Pacific

As a Regional Bureau for Science, it covers Asia and the Pacific Region, through its programmes in Freshwater, Oceans, Basic and Engineering Sciences, Earth Sciences, and Coastal zones and Small Islands.





United Nations
Educational, Scientific and
Cultural Organization



International
Hydrological
Programme

10 Key Global Challenges

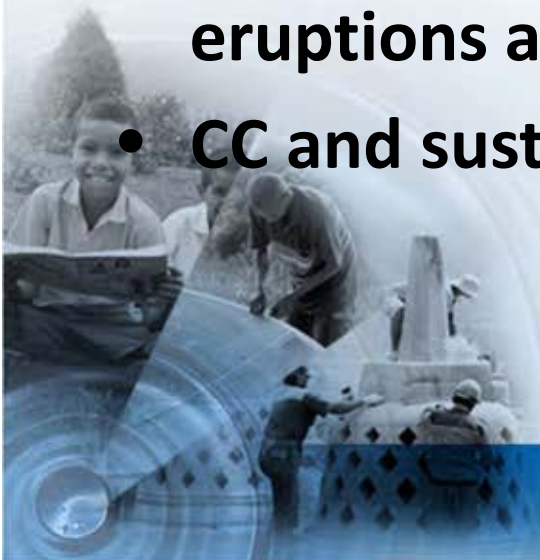
- Poverty eradication
- **Pollution**
- Population growth and urbanization
- Food security and sustainable production
- Old and **New diseases**
- **Energy**
- **Disasters**
- **Water and environmental resources**
- **Climate change**
- **Peace and security**





Inter-connectedness of Global Challenges

- **Water – Energy – Food security**
- **CC and renewable energy**
- **CC and pollution**
- **CC and food security**
- **CC and natural disasters (impact of floods, volcanic eruptions and GHG emissions)**
- **CC and sustainable cities**





Recognition of Key Global Challenges

Climate Change/Global Change

Adaptation to increased hazard, innovation, focus on natural disasters

Rapid urbanization and population growth

Sustainable Infrastructure

Poverty

Access to infrastructure, services, rights, and technologies

Sustainability

Innovation

Technology

Evidence of Shifting Tropics

BULGING WAISTLINE

Expansion of the tropics can be seen in the Hadley cell, the circulation pattern that carries warm air upwards above the Equator and then down at about 30° N and 30° S. The descending limb of each Hadley cell is shifting towards the pole in both hemispheres, potentially altering climatic conditions in some regions.



The mystery of the expanding tropics

As Earth's dry zones shift rapidly polewards, researchers are scrambling to figure out the cause — and consequences: Olive Heffernan Nature Feb 2016



United Nations
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Cultural Organization

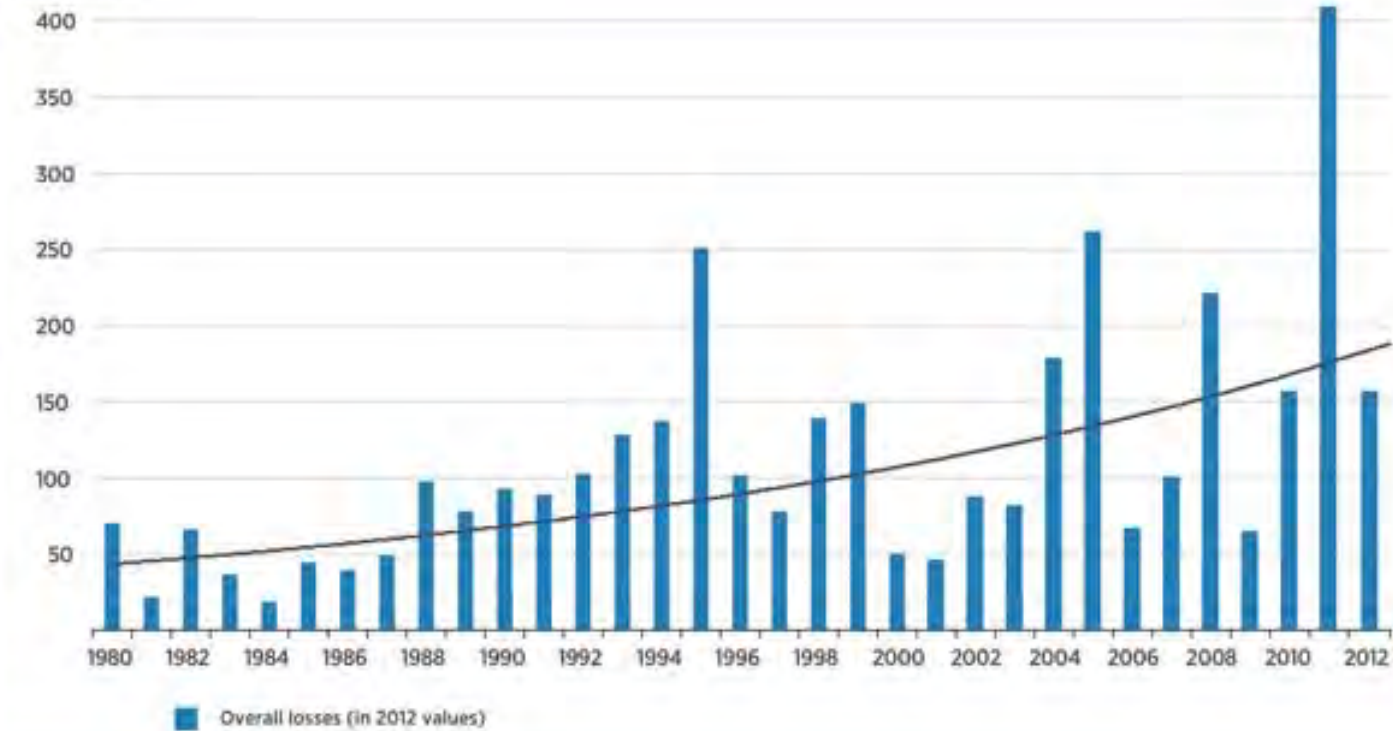


International
Hydrological
Programme

'Natural' Disasters



(US\$billions)



The New Global Development Agenda



Have maintained the idea that scientific and technological innovation can help to achieve sustainable development.

Put People and Wellbeing of Human and Planet at the Centre



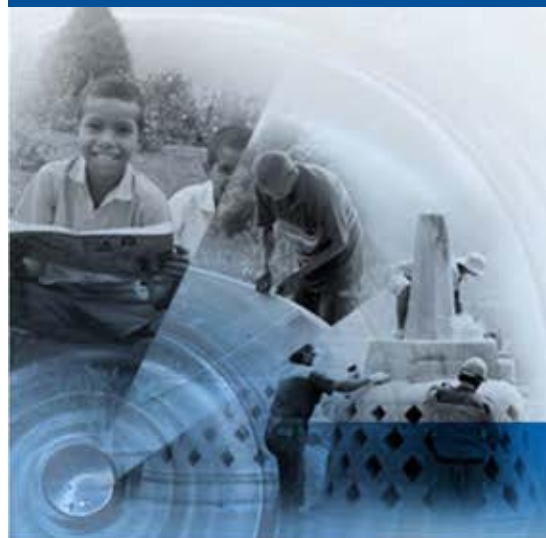
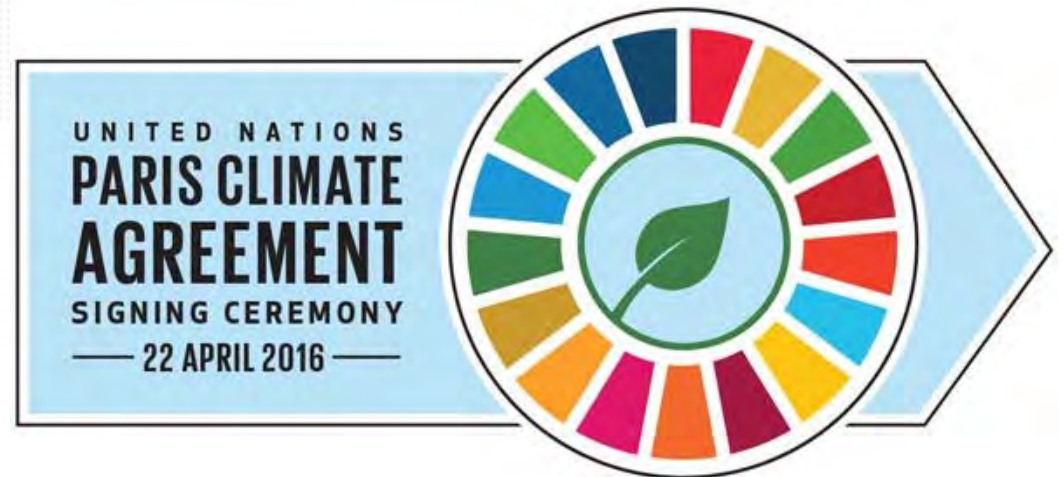
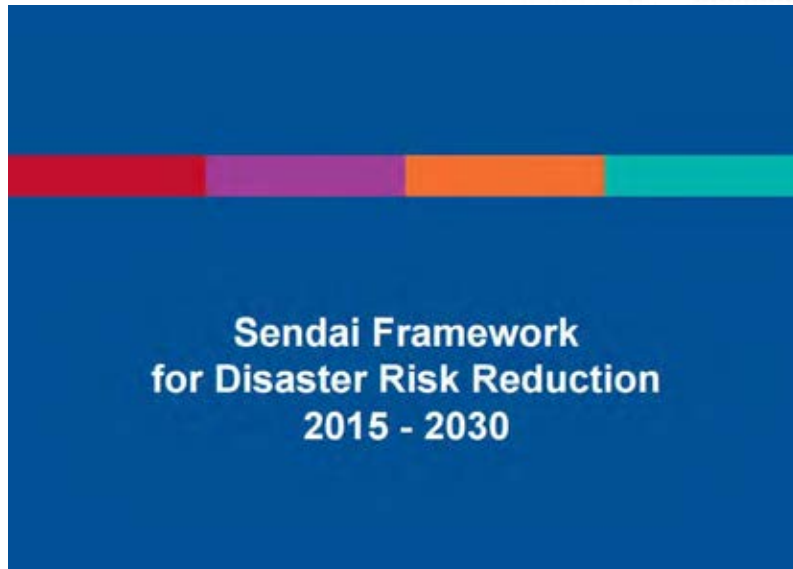
United Nations
Educational, Scientific and
Cultural Organization

UN Agenda 2030 SDGs





Related International Developments





Selected IHP VIII Contributions in Asia and the Pacific In addition to activities described in Inf.3 page 18-19

1. Analysis on the use of Ecohydrology and IWRM concepts or principles for providing solutions to the current water challenges in Asia and the Pacific region and in Africa.
2. Study on Sustainable Water Management in Yogyakarta City and Borobudur Surrounding Areas
3. Development of a comprehensive study on improving water services towards water security in Medan City
4. Study on “Enhancing Resilience to Disasters of Urban Water Systems of Mindanao” in Philippines
5. Groundwater resources in the Greater Mekong Subregion; Increased Resilience through collaborative GW resource management

Global Centre of Excellence for Water Hazard and Risk Management

ICHARM

International Centre for Water Hazard and Risk Management under the auspices of UNESCO



Asia Pacific Centre for Ecohydrology (APCE)
Category II Center of UNESCO



United Nations Educational, Scientific and Cultural Organization



United Nations Educational, Scientific and Cultural Organization



Regional Centre on Urban Water Management (under the auspices of UNESCO)



Selected IHP Activities



International Seminar on “Ecohydrology Management of Putrajaya Lake and Wetland: Ecosystem Services Economic Assessment”

19 to 20 January 2016 in Dewan Seri Melati, Perbadanan Putrajaya, Malaysia

The seminar was part of the dissemination process of the findings of the research on ecosystem services economic assessment initiated by UNESCO Office Jakarta under the project "Upscaling water security to meet local, regional, and global challenges" supported by Malaysia Fund in Trust (MFIT) and conducted by Perbadanan Putrajaya, in collaboration with Eco Development Facilities Sdn. Bhd. (EDFSB) and University Putra Malaysia (UPM) experts. Attended by 218 participants (including 127 men and 91 women), the seminar also brought together lake managers and other researchers from ASEAN countries such as Indonesia (Lake Rawa Pening), Philippines (Lake Lanao), and Thailand (Lake of Prince Songkla).

“Agenda 2030 Partnership Meeting with Metro Cebu Development & Coordinating Board (MCDCEB)” February 1, 2016 in Cebu City, Philippines.

UNESCO Jakarta met with Metro Cebu Development & Coordinating Board (MCDCEB) and Ramon Aboitiz Foundation INC (RAFI) in Cebu City to discuss about areas of sustainable cities, communities and integrated water management partnership and collaboration opportunities.

This meeting is part of UNESCO’s partnerships on achieving Global Agenda 2030 with local communities in the Philippines.

The International Workshop on Water Tariffs, Governance and IWRM for Sustainability will be held in August 2016 in Cebu City, Philippines.





United Nations
Educational, Scientific and



International
Hydrological

Selected IHP Activities



International Sediment Initiative



United Nations
Educational, Scientific and
Cultural Organization



under the auspices of
UNESCO

WORKSHOP ON COMPARATIVE STUDIES OF APPLYING ECYDROLOGY AND IWRM FOR UPSCALING WATER SECURITY IN ASIA & AFRICA
7 - 9 March 2016 | Berjaya Times Square Hotel, Kuala Lumpur

Supported by:

In collaboration with:

INTERNATIONAL FLOOD INITIATIVE

INTERNATIONAL DROUGHT INITIATIVE

G-WADI

National Strategic Meeting on Water Security and SDGs in Indonesia
13 - 14 April 2016 | Grand Kemang Hotel, Jakarta

6 CLEAN WATER AND SANITATION

Supported by:

In collaboration with:

Experts' Consultation Meeting for Advancing Water Education in Asia and the Pacific
24 - 25 May 2016, Medan - Indonesia

Supported by:

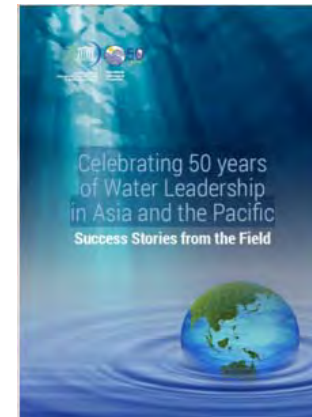
In collaboration with:



Fostering UNESCO Water and Environment Networks in the Asia-Pacific Region



- **The 23rd IHP Regional Steering Committee for Southeast Asia and the Pacific (RSC-SEAP) 19-22 October 2015 in Medan, Indonesia.**
 - UNESCO International Symposium on "Integrated Actions for Global Water and Environmental Sustainability" and the 23rd meeting of the IHP-RSC SEAP.



- **Regional and Interregional Science Cooperation Meeting for Asia and the Pacific (IHP and MAB networks) 21-24 July 2016 in Bali, Indonesia**
 - Bringing together IHP and MAB networks in the region for Science exchange and cooperation in Asia and the Pacific region.



International Hydrological Programme Water Informatics for Sustainability and Enhanced Resilience in Asia and the Pacific



- **Training and dissemination of the Catalogue of Hydrologic Analysis first module .**
 - capitalizing on the Catalogue of Rivers which has been developed in the region since 2002 and provide hydrological models of river basins in the region as the starting point of comprehensive extreme climate risk management and to give scientific background for policy recommendation.
- **Development of curriculum for water education on ecohydrology and IWRM for climate change water disaster impact resilience based on sustainability science in Asia and the Pacific**
 - including a visioning workshop linking science and policy.
- **26th IHP Training Course with Nagoya and Kyoto universities.**
- **24th IHP-RSC meeting in Mongolia October 2016**
- **25th IHP-RSC meetings in 2017**

7th ICWRER

June 5-9, 2016 Kyoto, Japan





UNESCO Post 2010 Floods Actions in Pakistan

- 1) UNESCO DG sent a team of flood management experts to Pakistan on 22nd August 2010.
- 2) Based on the mission to Pakistan, UNESCO prepared response project with the Pakistani authorities to reinforce the country's capacity in:
 - integrated flood and watershed management
 - groundwater resources for emergency situations
 - landslides and ground instability especially for relocation of affected population.
- 3) UNESCO operates two projects* in Pakistan with total funding of USD 7.7 Million funded by the Government of Japan. *Phase I from August 2011 and Phase II from March 2015



Utilizing Satellite Based Technologies

The image displays a collection of logos for satellite-based technologies. At the top left is the JAXA logo. To its right is the ICHARM logo. Below JAXA is the GSMCP logo, which includes the text 'GLOBAL SATELLITE MAPPING OF PRECIPITATION'. To the right of GSMCP is the IFAS logo, with the text 'Integrated Flood Analysis System'. At the bottom right is the RRI logo, with the text 'Rainfall-Runoff-Inundation Model'. A small satellite image is also visible at the bottom left of the box.

International Workshop organized by UNESCO and PMD on “Standardizing Flood Forecasting and Warning Approaches in Transboundary Catchments”

Avari Hotel, Lahore, Pakistan
19-20 April 2016



2days workshop with Embassy of Japan, JICA, PMD, SUPARCO, NDMA, Regional Irrigation Departments, ICHARM, JAXA and Pakistani universities (NUST, UET-Lahore), co-hosted by PMD and UNESCO



Presentation by Prof Toshio Koike, Director of ICHARM



Opening remarks

(Left: H.E. Mr. Abid Sher Ali, Minister of State for Water and Power Centre: Ms. Vibeke Jensen, Director, UNESCO Islamabad Right: Dr. Ghulam Rasul, DG of PMD)



Young engineers of PMD with their in house developed Automated Weather Station (AWS) (more than 35% lower than international standard price)



United Nations
Educational, Scientific and
Cultural Organization

International Training for Pakistan and Afghanistan

“Introduction to rainfall-runoff modelling and

Hands on training on IFAS and RRI models”

FFD, Lahore, Pakistan

22-26 April 2016



Introduction of Mr Aziz Aimaq, director
ANDMA and Mr Farhad Nayyer, Modeller
MEW to Mr Riaz, Chief Meteorologist, FFD
in presence of ICHARM (Mr Iwami, Dr
Tsuda)



13 participants (incl. 2 Afghan
officers from ANDMA and MEW, FFD,
NUST and UET with 4 women)
received a 4 days intensive training
delivered by ICHARM on IFAS and
RRI in FFD.



RRI-Graphic User Interphase and IFAS
Quick Reference manuals



Mr Aziz (top right)
and Mr Farhad
(down) receiving
their IFAS/RRI
training certificates
from Prof Shahbaz
(UNESCO)



Dr Amara, lecturer
at UET Lahore
receiving IFAS/RRI
training certificate.



UNESCO Contribution to the Regional Coordination Mechanisms



Asia Pacific Water Forum (APWF)

UNESCO Jakarta participated to the Governing Board Meeting of the Asia-Pacific Water Forum (APWF) on 24 Feb 2016 in Singapore during which discussions included APWF partners water actions for sustainable development in the region and scoping of the 3rd Asia-Pacific Water Summit in 2017 in Mongolia. The meeting was held at the PUB WaterHub which was set up in May 2006 by the Singapore's Ministry of the Environment and Water Resources.



Asia Water Council (AWC)

UNESCO Jakarta participated to the 1st General Assembly of the Asia Water Council (AWC) from 24 to 26 March 2016 in Bali, Indonesia. Hosted by Ministry of Public Works and Housing, Indonesia and organized by the Asia Water Council Secretariat in collaboration with K-Water (Republic of Korea), the First General Assembly of the Asia Water Council (AWC) aimed at the official establishment of the AWC as a major player and contributor to address the challenges related to water management in Asian countries.



United Nations
Educational, Scientific and
Cultural Organization



International
Hydrological
Programme


Thanks!



Regional Sciences Bureau for Asia and the Pacific - UNESCO Office, Jakarta²⁰

MONGOLIAN WATER POLICY ON WATER AND CHALLENGES

Myagmar.Sh, Director, Division of Water resources



Ulaanbaatar
2016.11.03

CONTENTS

1. LEGISLATION FRAMEWORK ON WATER
2. STRUCTURE OF THE WATER SECTOR
3. MAIN DUTIES
4. MONGOLAN WATER RESOURCES
5. WATER USE AND PROTECTION
6. MAIN ACTIVITIES
7. SOME CHALLENGES
8. PRIORITIZED POLICY ACTIONS
9. CONCLUSION



The Government
action plan for
2016-2020



Law on environmental
protection



Law on water



Law on fee for natural
resource utilization



Law on water
pollution fee



Law on urban water supply
and sanitation



Law on prohibition of
mining activities in river
heads, protection zone
of water resources and
forest area

LEGAL FRAMEWORK OF THE WATER SECTOR

National
sustainable
development
framework-2030



National security
framework



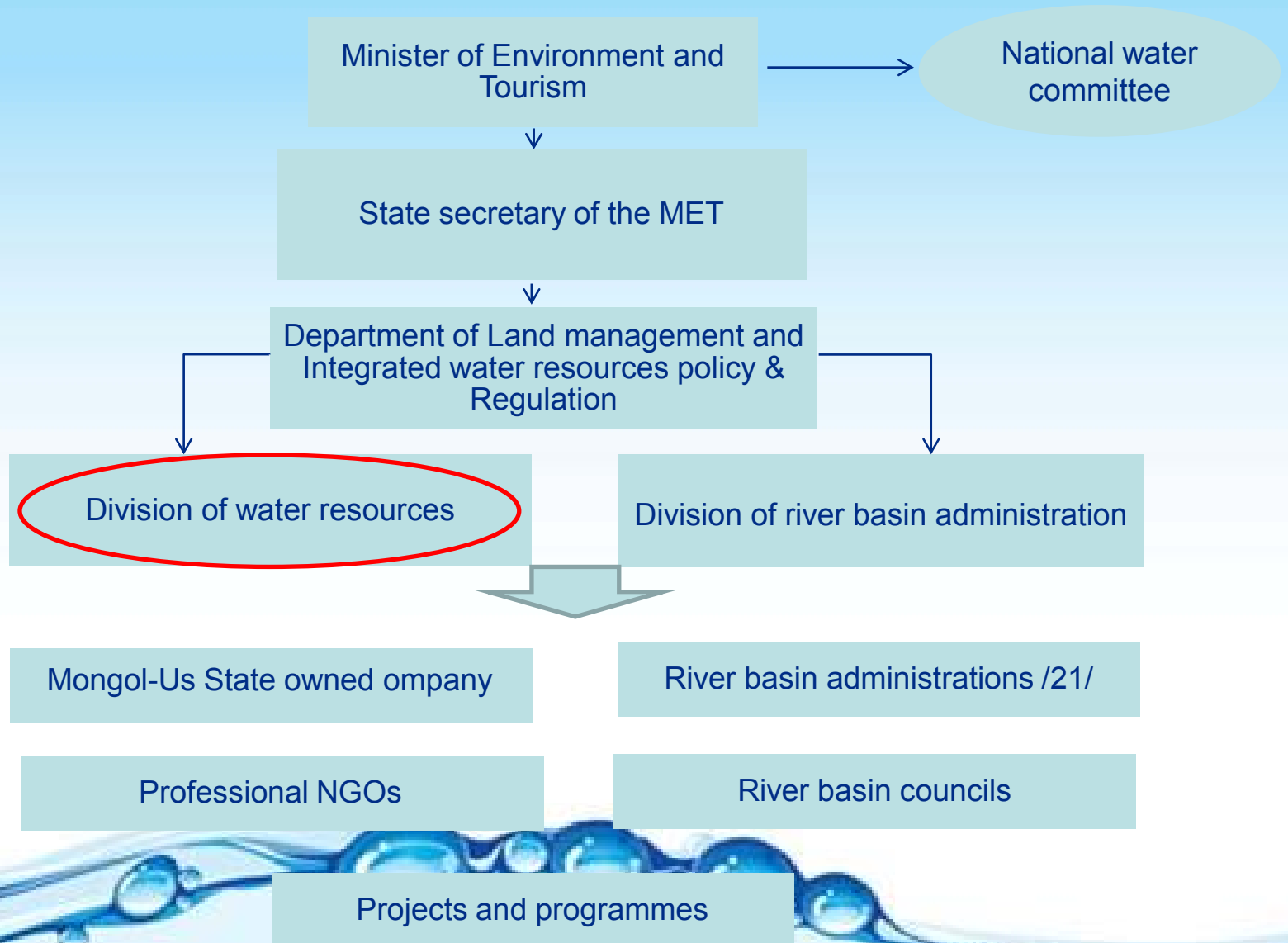
National
IWRM plan



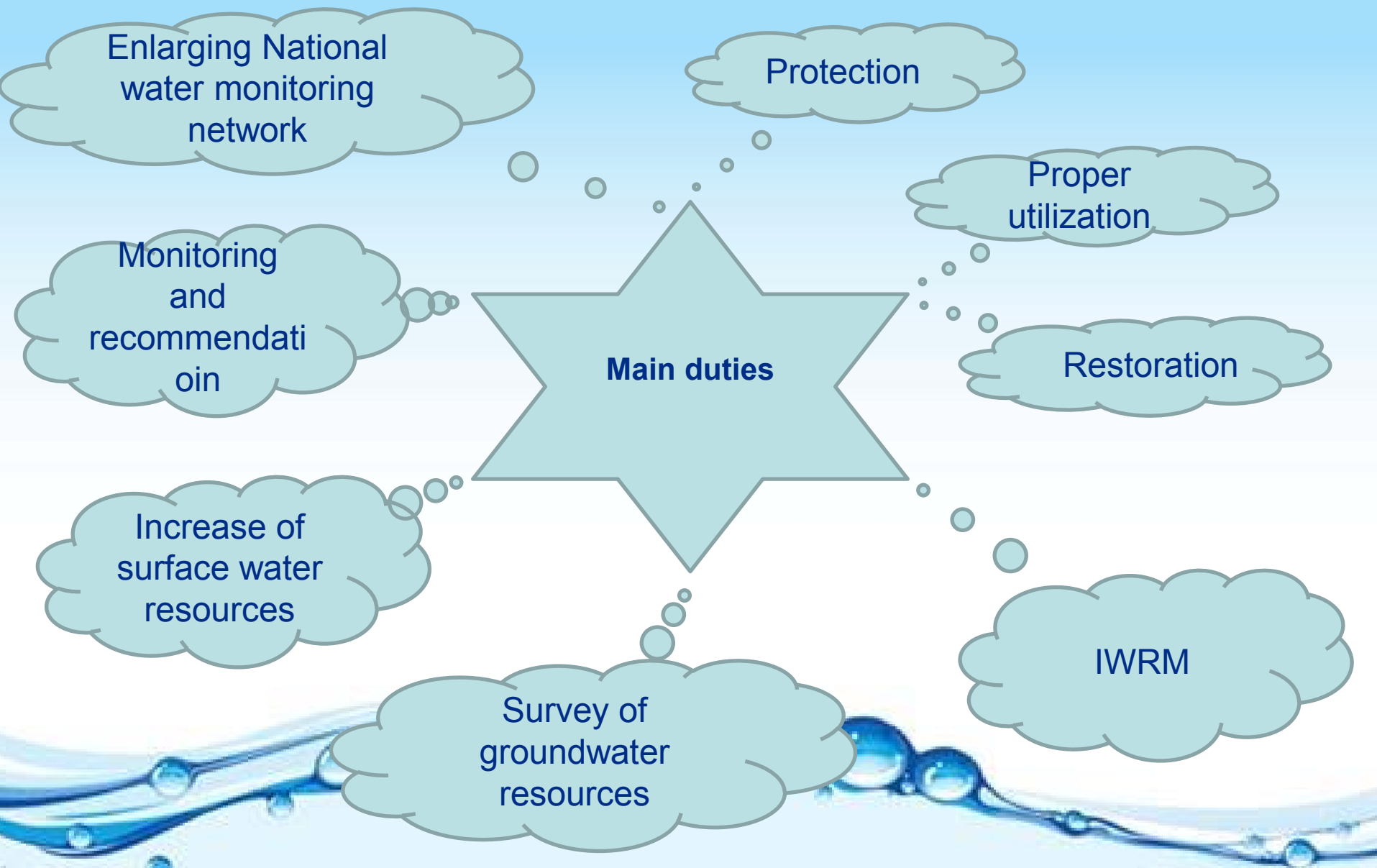
“Water” National program



SECTORAL STRUCTURE



DIVISION OF WATER RESOURCES

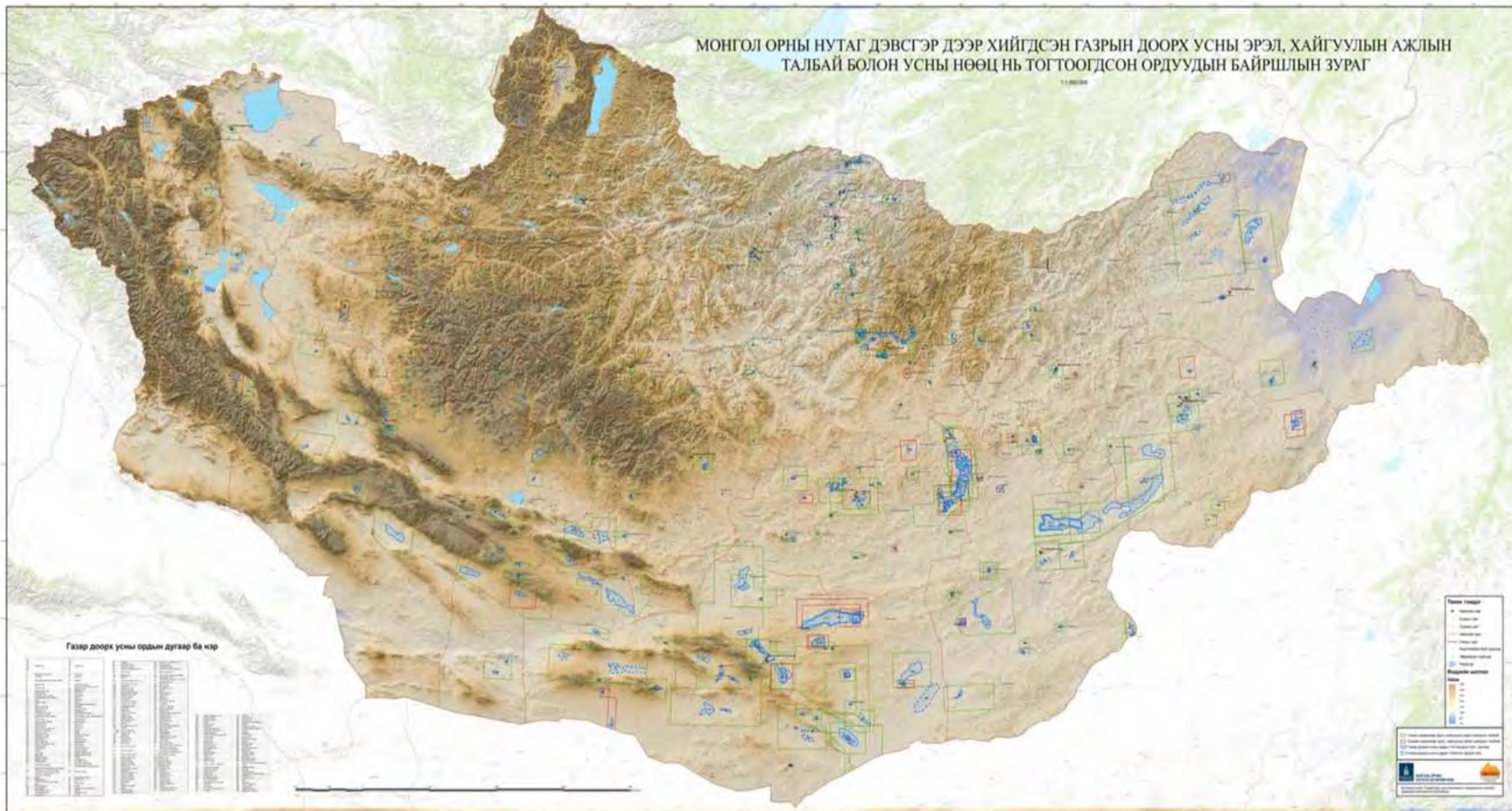


Water resources Mongolia



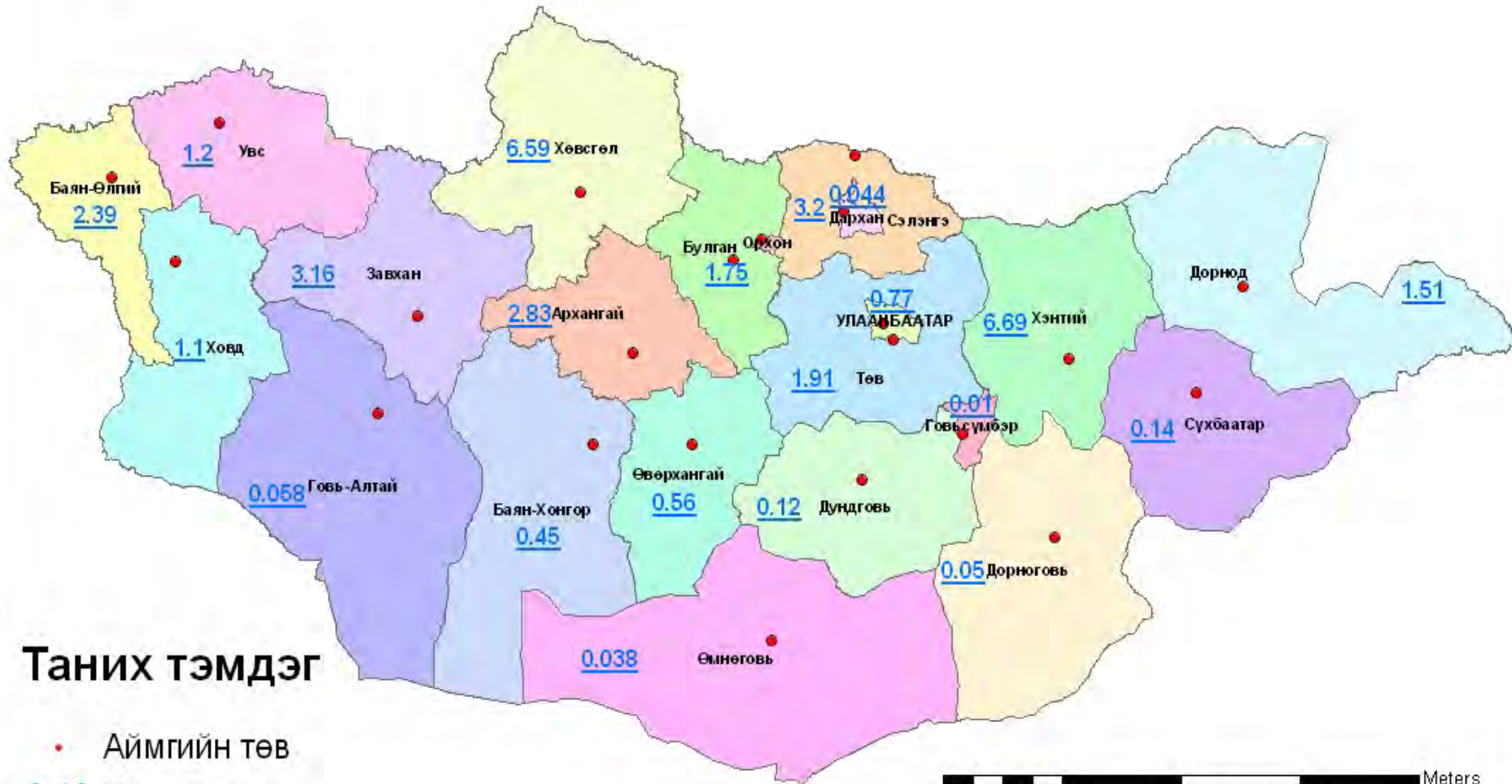
Ground water resources

Total ground water resources is estimated as approx. **10,800** Mil.м³





Surface water resources

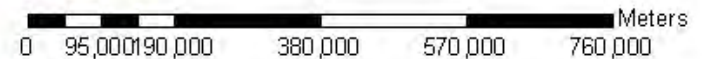


Таних тэмдэг

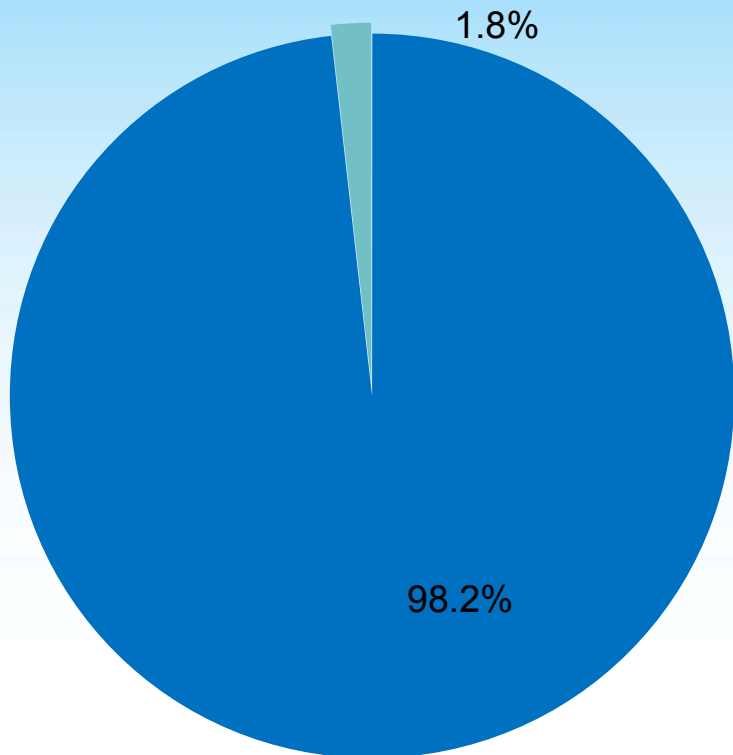
• Аймгийн төв

3.16 Усны нөөц

□ Аймгийн хил



Total water resources of the country /Mil.m³/



Type	Total amount /Mil.m ³ /	Percentage
Lake	500,000	82.2
Rivers	34,600	5.7
Glaciers	62,900	10.3
Ground water	10,800	1.8
Total	608,300	

■ Гадаргын усны нөөц

■ Газрын доорхи усны нөөц



Water use and protection



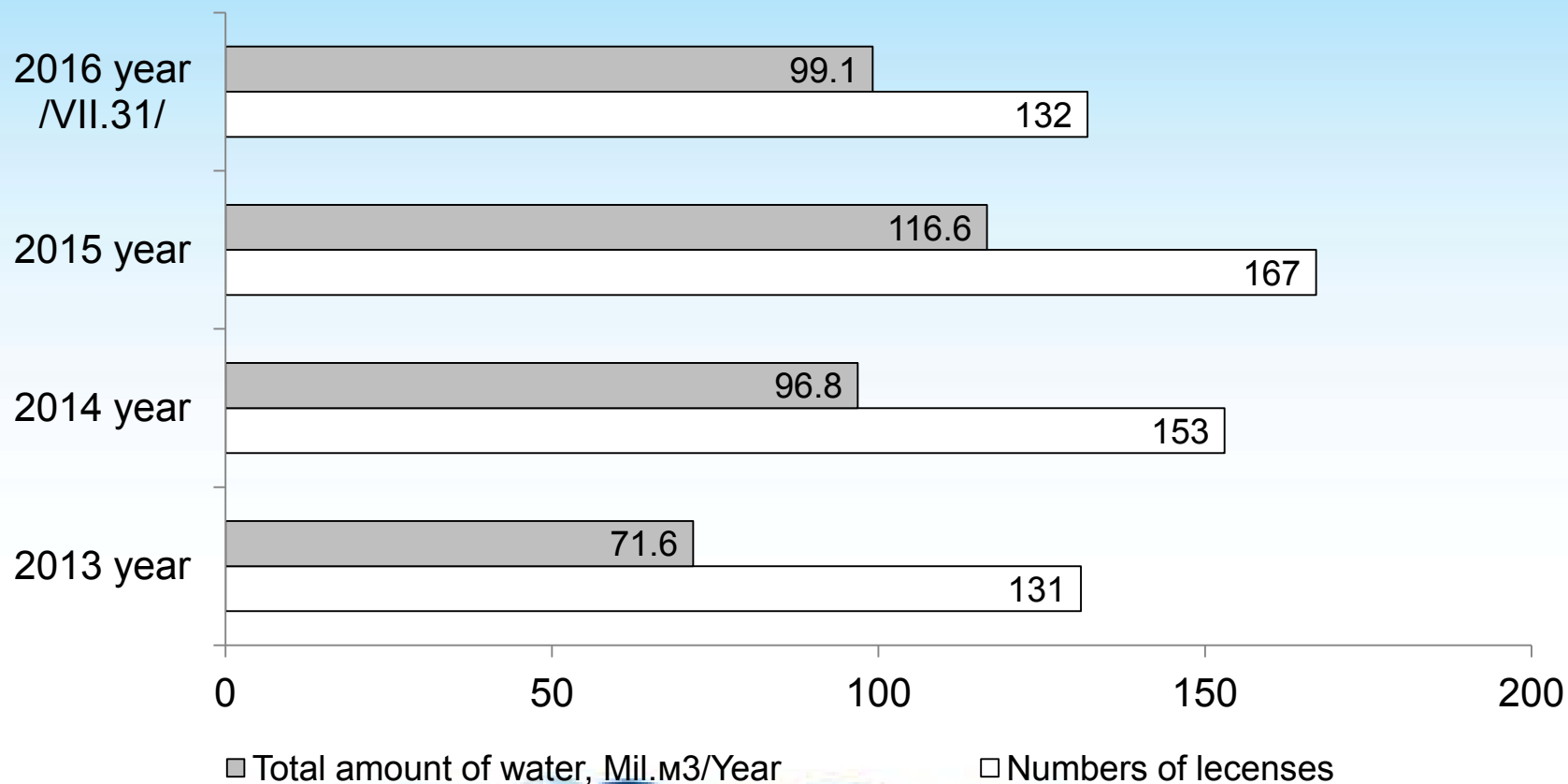
Current status of the ground water use



Mining use: 11,500 м³/year - 21,024,500м³/year

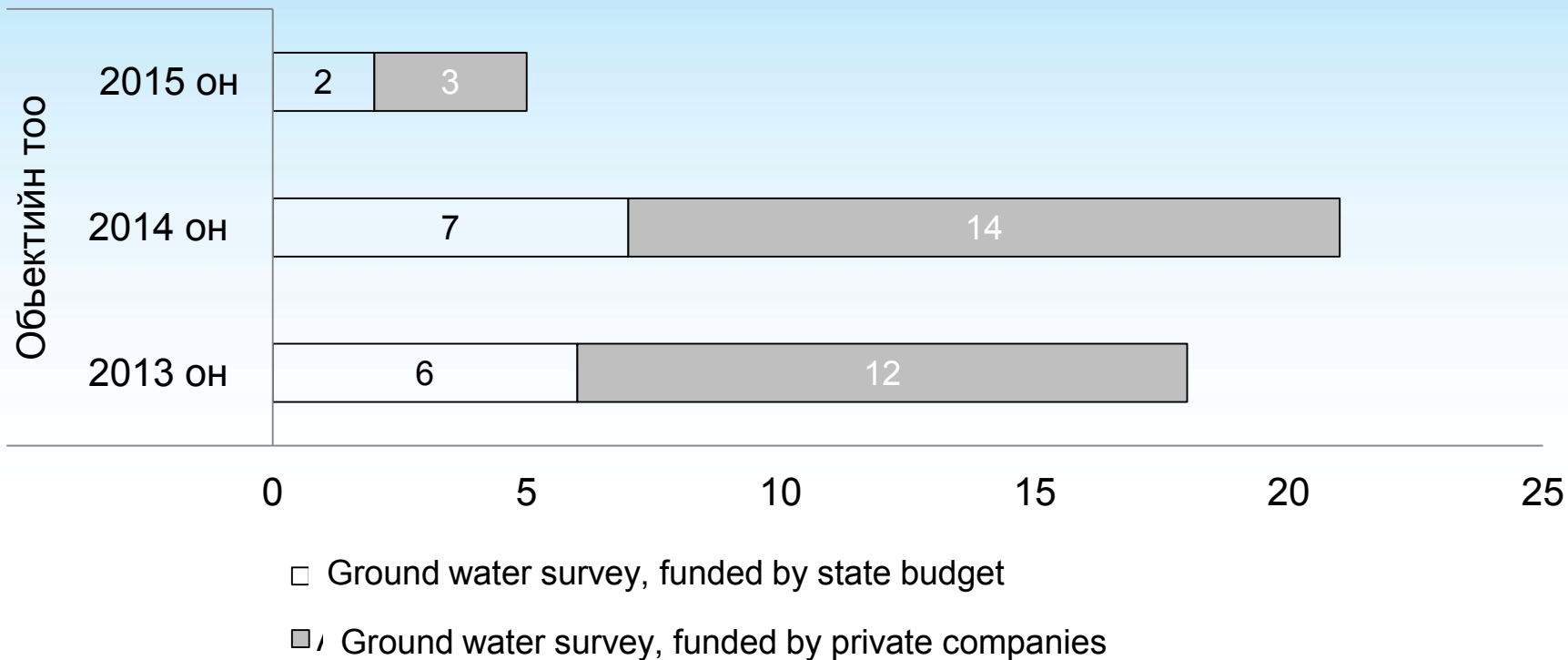
Water use permission

Number of larger companies, who were issues by water use licenses
Amount of licensed water /Mil.m³/



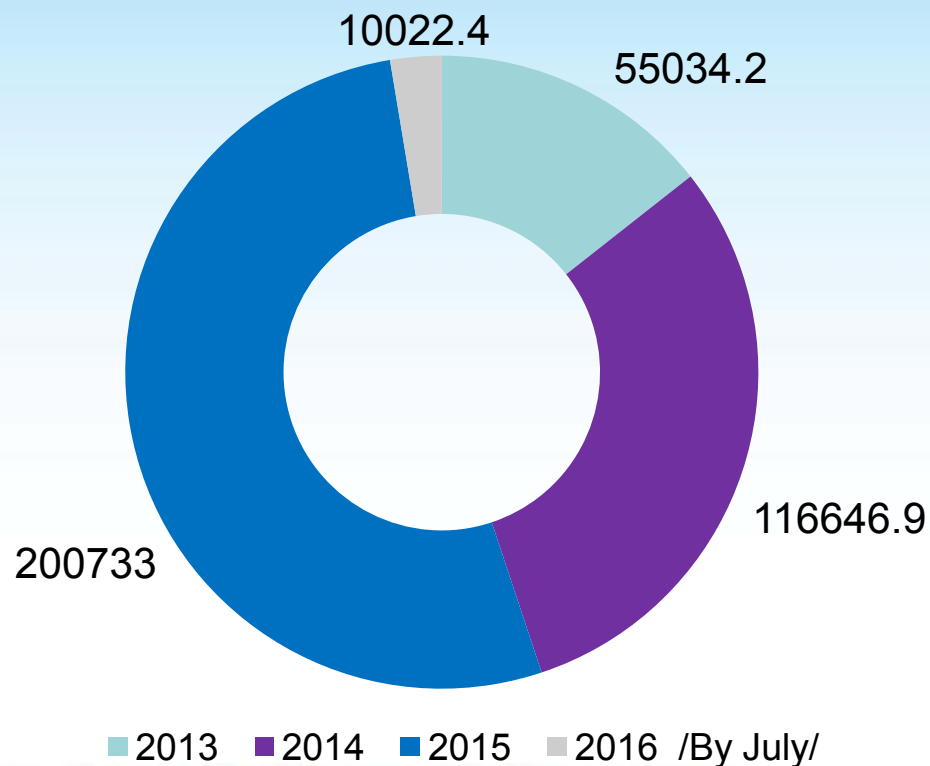
Increasing water resources

Approved ground water deposits /2013-2015/

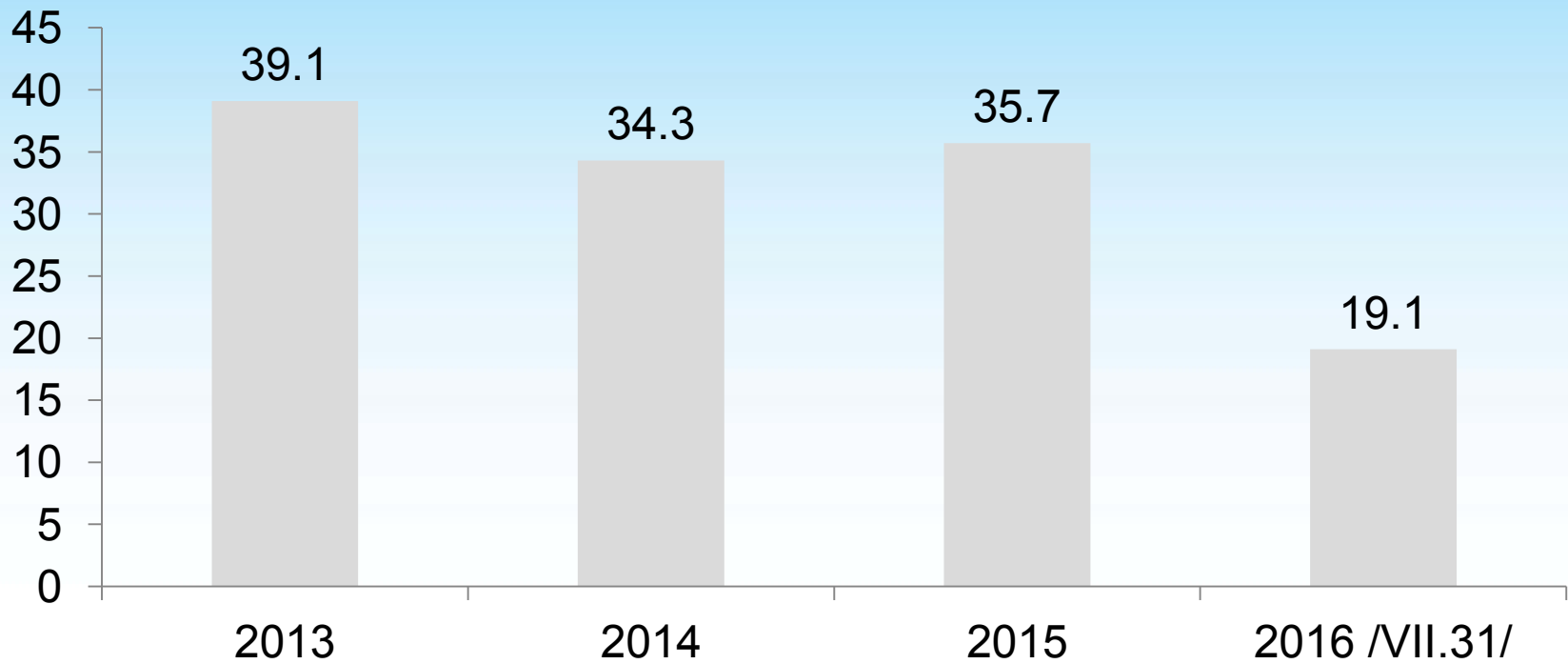


Increasing water resources

Approved ground water resources m^3/day



Total income generated from the water use /by Tugrigs/



■ Fee for water and mineral water use

TOTAL **128.2** billion tugrigs

Water resources protection

By 2016, 44,5% of the total area of river heads has already been secured under the national protection.



Hygiene zone was established at least 50 meter from the bank of water storage and at river flood-plain

Current policy measures

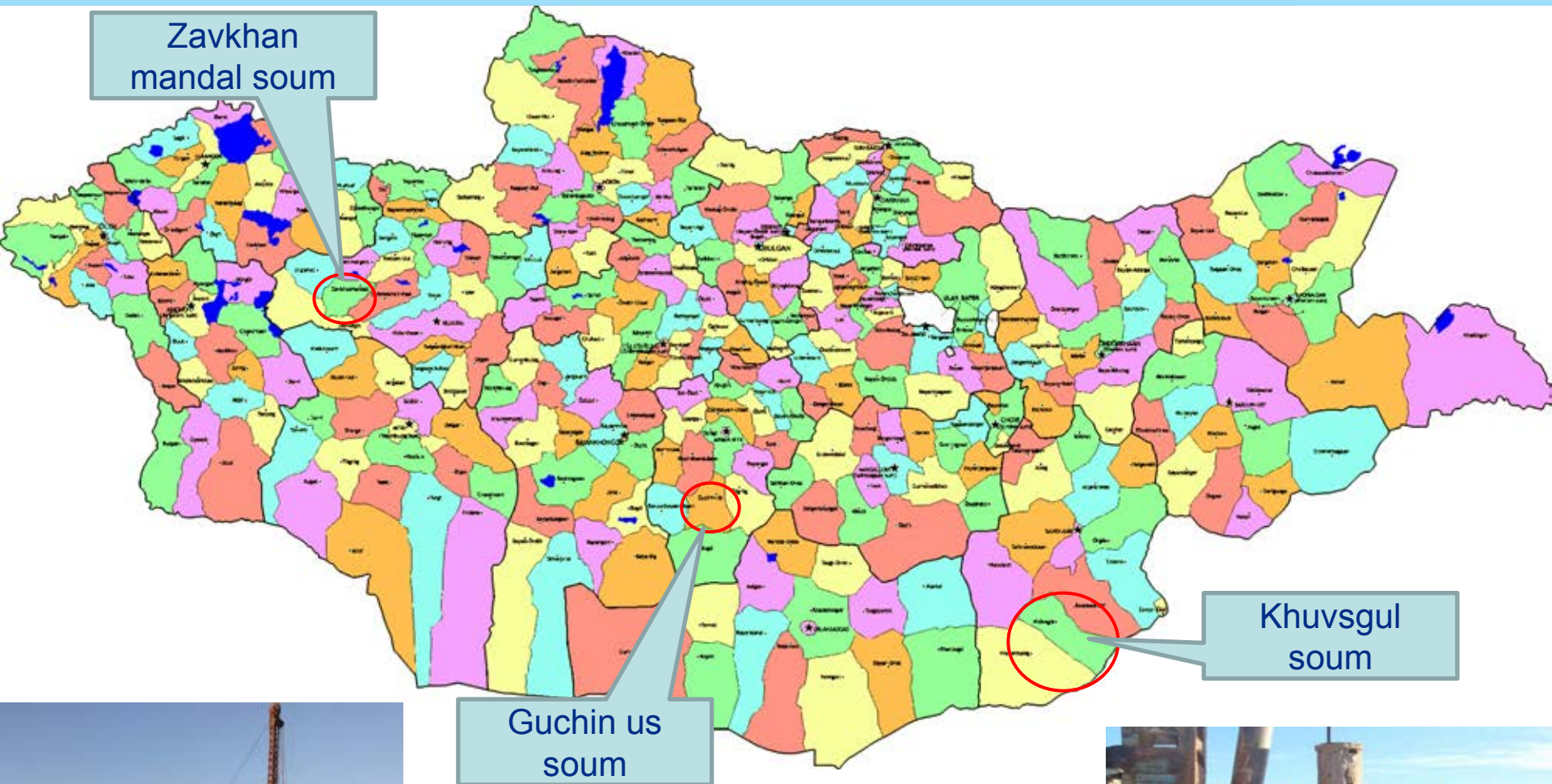


IWRM plan of River basins

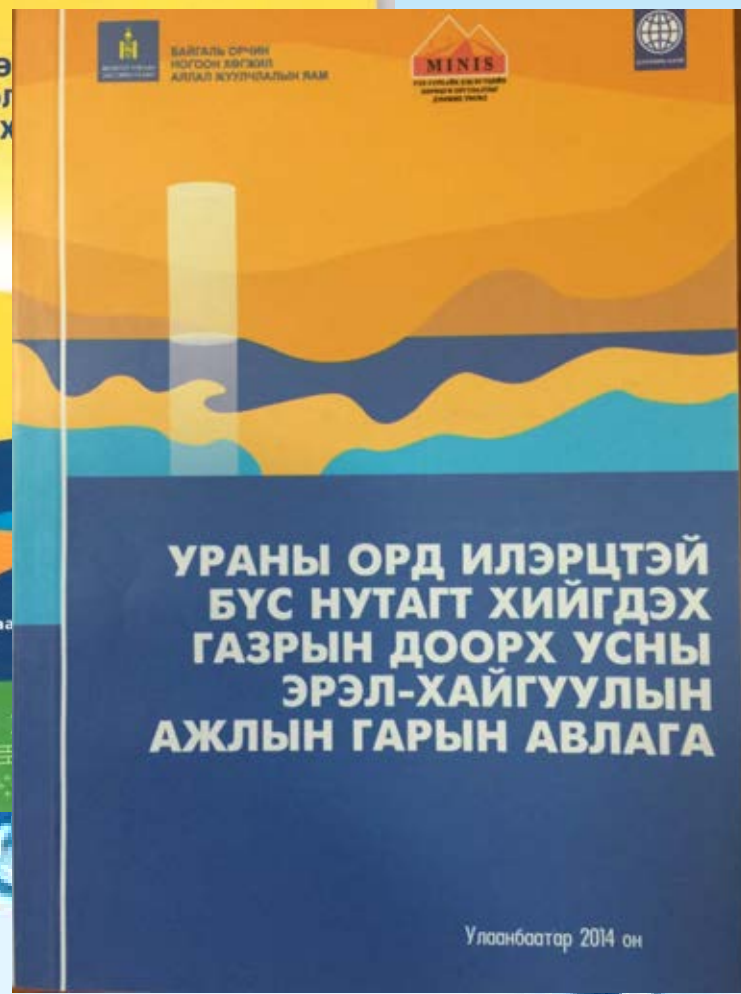
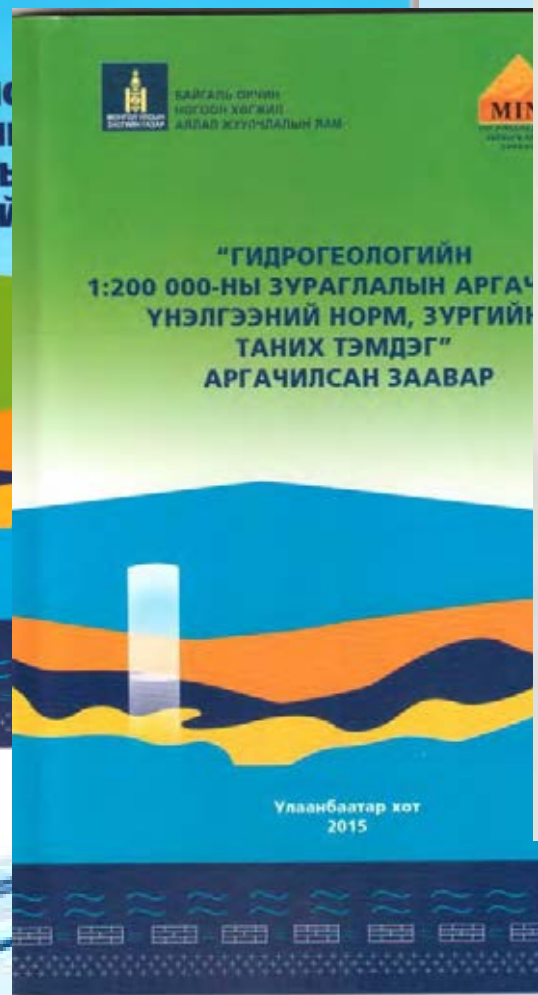
River basins, of which IWRM was approved	River basins, on the process of IWRM plan approval	River basins, under development	River basin, of which IWRM plan need to be developed
<p>Туул гол, Орхон гол, Онон гол, Хар нуур-Ховд гол, Хяргас нуур-Завхан гол, Улз гол, Хөвсгөл нуур-Эгийн гол, Идэр гол, Бөөнцагаан нуур-Байдраг гол , Буйр нуур-Халх гол, Онги, Хануй, Увс нуур-Тэсийн гол,</p> <p>TOTAL13</p>	<p>Сэлэнгэ гол, Ерөө гол, Дэлгэрмөрөн гол, Хараа гол, Хэрлэн гол, Хүйсийн говь-Цэцэг нуур,</p> <p>TOTAL 6</p>	<p>Галба-Өөш Долоодын говь, Умард говийн гүвээт- Халхын дундад тал, Алтайн өвөр говийн сав газар,</p> <p>TOTAL 3</p>	<p>Шишхэд гол, Таац гол, Орог нуур-Түйн гол, Мэнэнгийн тал, Чулуут гол, Үенч-Бодонч гол, Булган гол,</p> <p>TOTAL 7</p>



Water supply of soum centers



Improving capacity building






Over 800 natural springs were restored and renovated between the years of 2012-2016



Main challenges



Main challenges:

- Need to increase accumulation of surface water;
 - Need to approve regulations on water pollution fee in order to enforce the law on fee for water pollution
 - Address current pollution issue of Orkhon and Tuul rivers
 - Strengthen and enlarge the waste water treatment plants
 - Address current soil and water pollution
 - Increase re-investment of income generated from water use fee for water resource restoration and protection
 - Lack of investment in water sector
- 

Policy actions



Policy actions

- Need to approve regulations on water pollution fee in order to enforce the law on fee for water pollution
- Address Orkhon river pollution by developing action plan towards pollution decrease;
- Address Ganga lake pollution by analyzing the current situation and developing action plan for appropriate measures;
- To approve available ground and surface water recourse by each river basin;
- To improve Tuul river banks and establish “Eco” region along the river;
- Implement ground and surface water monitoring program;
- Increase number of ground water monitoring wells up to 500 by 2020

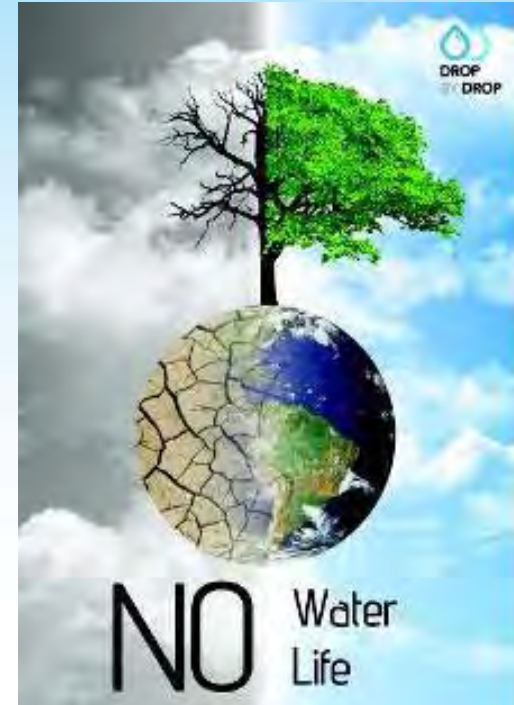


CONCLUSION

Almost 90% of total water consumption is being supplied from the ground water resources, which occupies only 2% in the total water resources. Hence, it is needed to increase use of surface water for all purposes.

However, there is no a comprehensive water infrastructure that can accumulate surface water, produce energy resources and provide water for all sectors

So, it is needed to apply advanced water saving technologies in all sector for increasing water resources, reusing and recycling water in order to adapt climate change impact.



Thank you for your attention!





筑波大学
University of Tsukuba



UNESCO24th IHP-Regional Steering Committee Meeting In Conjunction with the International and National Water Dialogue on the Delivery of SDG 6 in Mongolia and Wider Asia and the Pacific Region

24-26 October 2016, Ulaanbaatar Mongolia

International Session: Water Security in Arid Environment

Summary of UNESCO Chair Program on Sustainable Groundwater Management in Mongolia: Toward a Standard of Water Governance Considering Groundwater / Surface Water Interaction in Semi-arid Regions

Maki TSUJIMURA, Ph.D.

UNESCO-Chair on Sustainable Groundwater Management in Mongolia
Hydrology and Water Resources
Faculty of Life and Environmental Sciences
University of Tsukuba, JAPAN

Climatic Change Effect on Water Resources

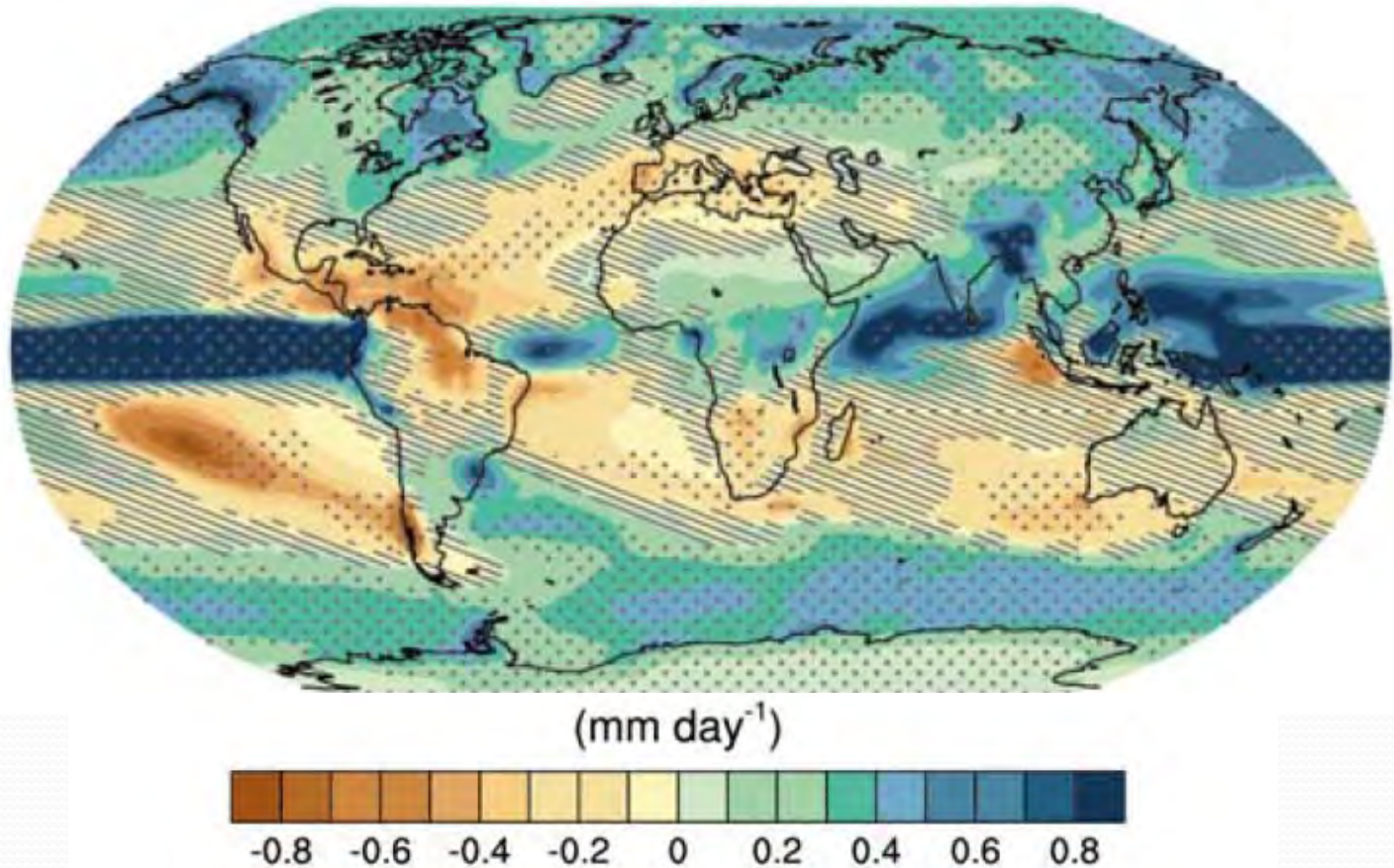
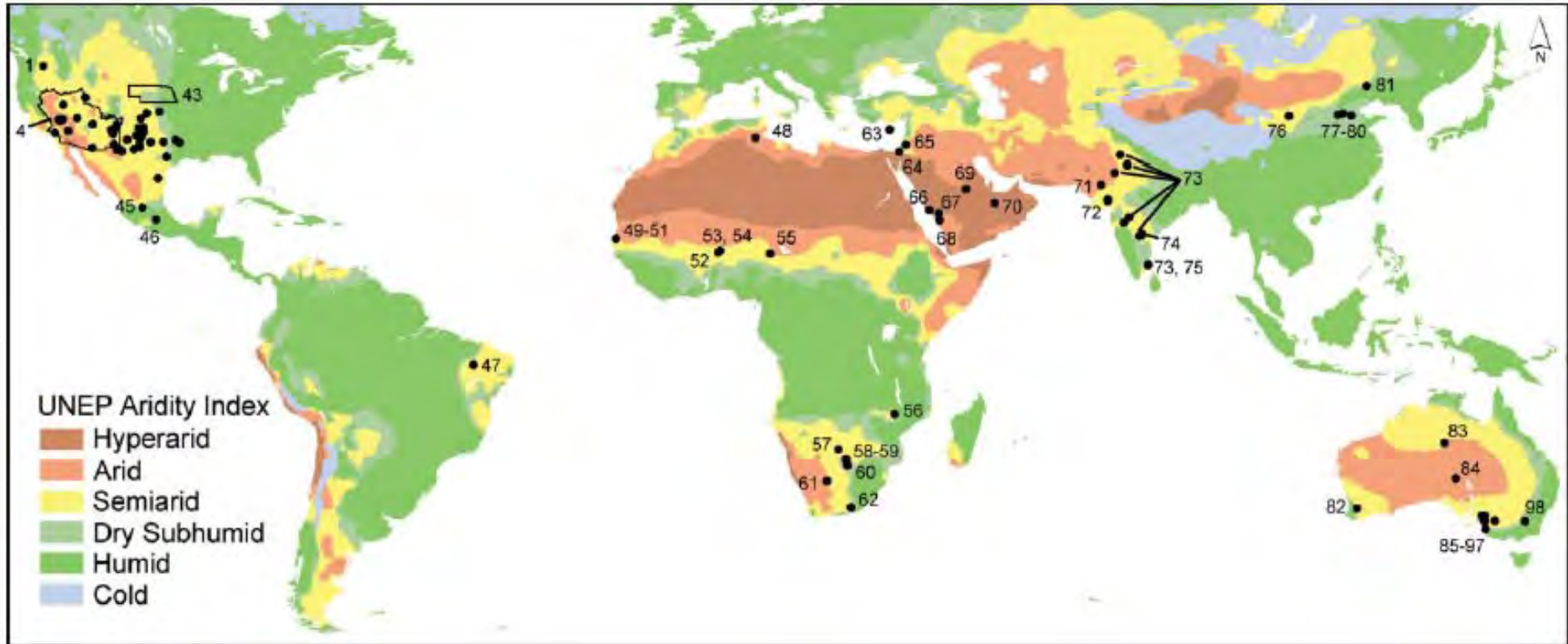


Fig. Annual mean precipitation change (IPCC, 2013)

- **Semi-arid** region highly depends on **groundwater**. (UNESCO, 2008; Jacobus, 2002)

Groundwater Recharge Researches in Arid/ Semi-arid Regions (Scanlon et al., 2006)

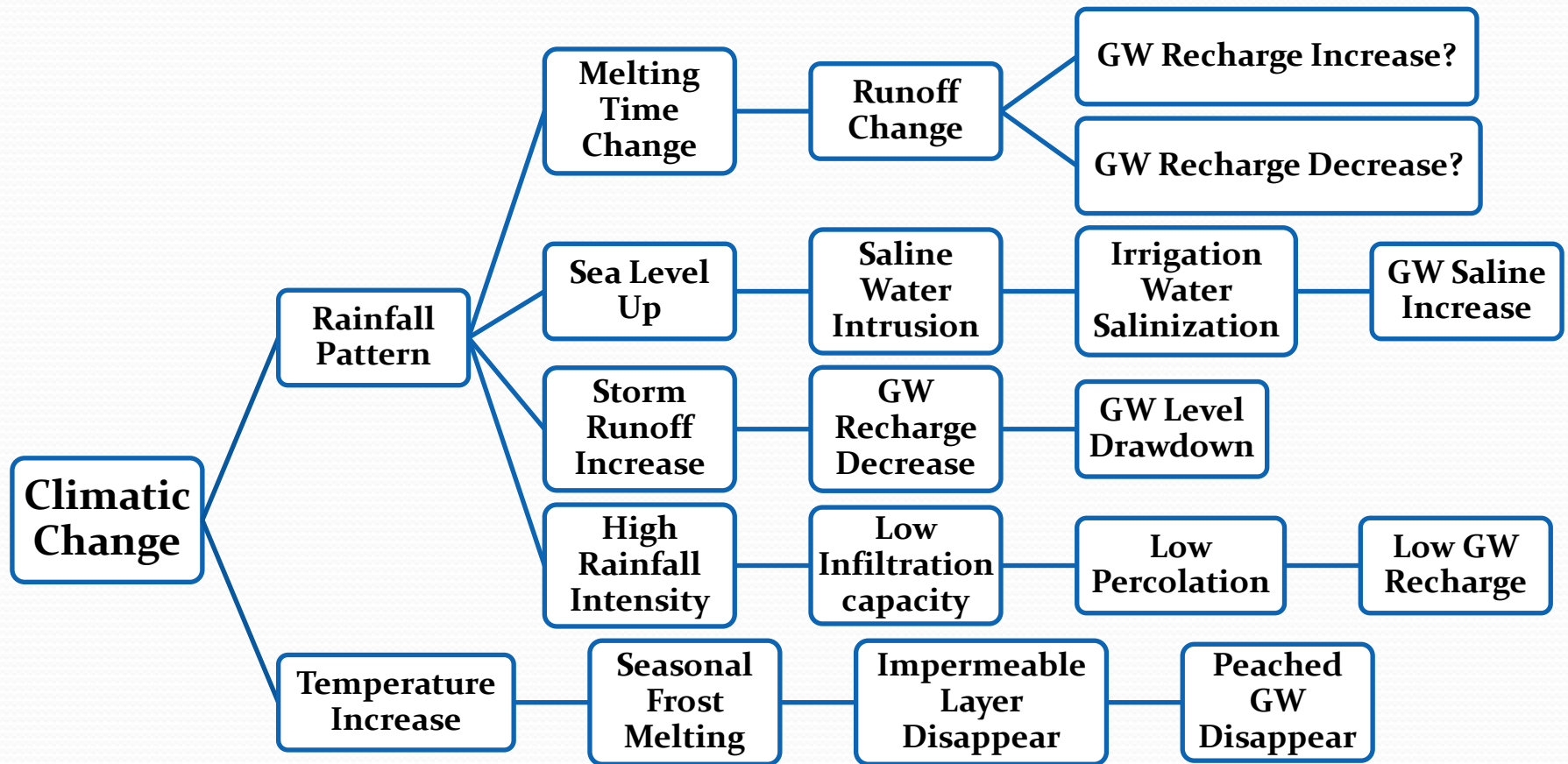


Numbers: Locations of previous study sites reviewed by Scanlon et al. (2006)

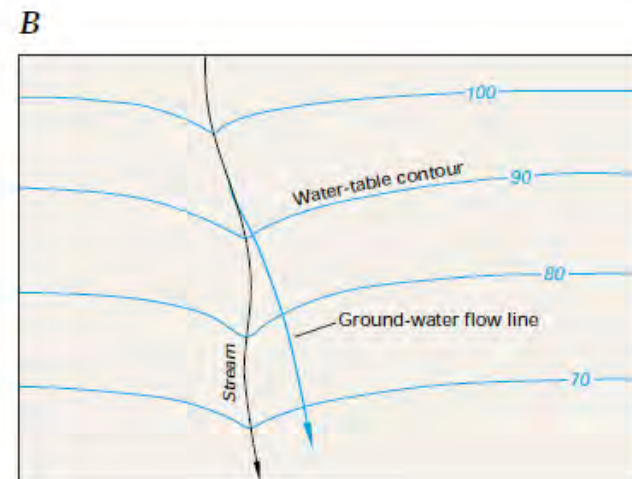
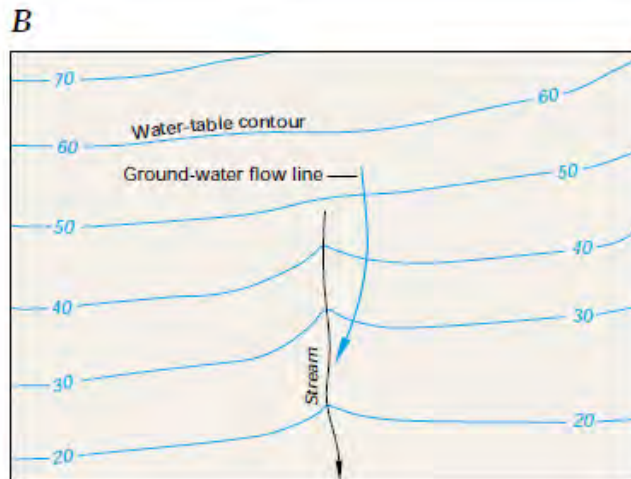
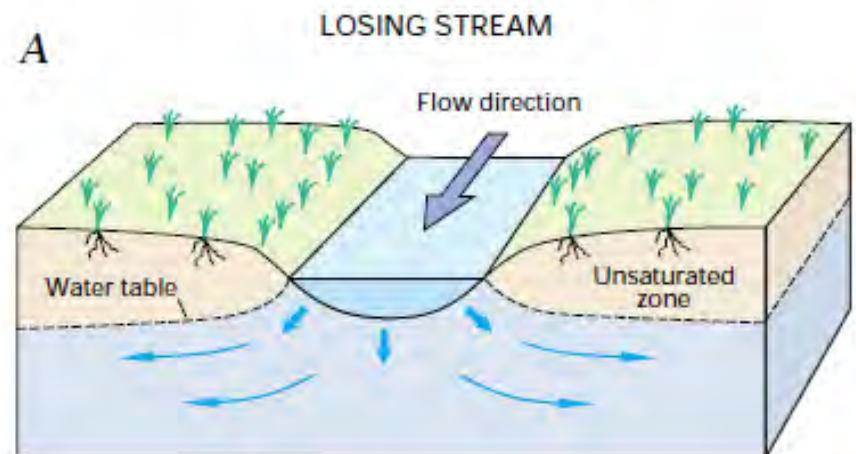
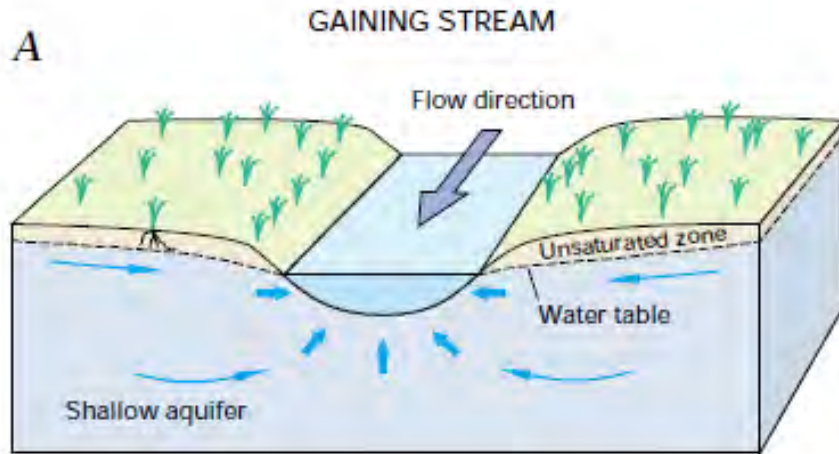
Recharge in arid/semi-arid region

- Low rainfall amount
- Low infiltration rate due to less vegetation
- High evapotranspiration rate
- Temporal and spatial heterogeneity in recharge
 - Recharge occurs at a specific location
 - Recharge occurs only by rainstorm with enough rainfall intensity

Possible Response of GW to Climatic Change



Interaction between Groundwater and Surface Water



Winter (1998)

National Training Workshop on “Groundwater Hydrology and Management”

- 14th to 15th June, 2006; Ulaanbaatar
- Organized by Mongolian National Committee for IHP (Prof. Basandorj)
- Dr. Jayakumar (UNESCO Beijing), Prof. Takara (Univ Kyoto), Prof. Kaihotsu (Hiroshima Univ), Prof. Jinno (Kyushu Univ), Dr. Hamaguchi (Kyoto Univ), Dr. Tsujimura (Univ Tsukuba)



- Lack of monitoring data on groundwater resources in Mongolia (Ulaanbaatar city area)
- Necessity of renewal for database on groundwater resources

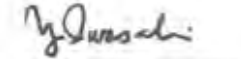
UNESCO Chair


Koichiro Matsuura
Director-General

Date: 14 JUN 2007


J. Tsogtbatar
Director

Date: 31 August, 2007


Yoichi Iwasaki
President

Date: 22 June 2007

- UNESCO-Chair on Sustainable Groundwater Management in Mongolia (Phase I: 2007-2009, Phase II: 2010-2012, Phase III: 2015-2018)
 - Monitoring system
 - Groundwater hydrological observation
 - Capacity building
 - Dataset
- Communication among sectors and disciplines



Mr. Tomimatsu



Mr. Ikeda



Dr. Jayakumar



Prof. Tanaka



Dr. Janchivdorj



Dr. Tsogtbatar



Major Activities

- 1st Chair meeting: 14th – 15th Feb, 2008 in Ulaanbaatar
- Students Study Tour to Mongolia, 9th – 15th Mar, 2008
- 2nd Chair Meeting: 2nd – 3rd June, 2008 in Tsukuba
- 3rd Chair Meeting: 3rd Oct, 2008 in UB
- UNESCO-Chair Workshop on Sustainable Groundwater Management in Arid and Semi Arid Regions: 1st Oct, 2008 in UB
- 16th UNESCO-IHP-RSC Meeting: 2nd – 3rd Oct, 2008 in UB
- UNESCO-IHP/GRAPHIC/GWES Meeting: 31st October, 2008 in Toyama, Japan



Major Activities

- Field survey campaign in UB, Aug. 2009
- UNESCO Chair Workshop on International Strategy for Sustainable Groundwater Management: Transboundary Aquifers and Integrated Watershed Management, 6th Oct, 2009, Univ Tsukuba
- 17th UNESCO – IHP-RSC Meeting, 5th – 6th Nov 2009, Wuhan, China
- Field survey campaign in UB, Aug 2010



Major Activities

- 20th UNESCO-IHP Training Course & Intern Symp “GW as a Key for Adaptation to Climatic Change and Society”, 7th-20th Nov, 2010, Kyoto/ Nagoya
- UNESCO-Chair Workshop on Sustainable Groundwater Management: Bridging Disciplines and Sectors, 24th Feb, 2011, Tsukuba
- **Regional G-WADI Workshop** on Climate Change Impacts on Water Resources Management in Arid and Semi-Arid Zones, Tehran, Iran 20th – 23rd June, 2011
- **Field survey campaign in UB**, Apr-May, 2013



Groundwater and surface water interactions in an alluvial plain, Tuul River Basin, Ulaanbaatar, Mongolia

Maki Tsujimura^{1*}, Koichi Ikeda¹, Tadashi Tanaka¹, Luntan Janchirvдорж², Badamgarav Erdenchimeg², Damdinbazar Unujargal², Ramasamy Jayakumar³

1. Division of Sustainable Environmental Studies, Faculty of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan

2. Institute of Geo-ecology, Mongolian Academy of Sciences, Ulaanbaatar 211238, Mongolia

3. UNESCO Beijing Office, Wajiaogongyuan 5-15-3 Jianguomenwai Compound, Beijing 100600, China

*Correspondence to: Dr. Maki Tsujimura, Professor in Division of Sustainable Environmental Studies, Faculty of Life and Environmental Sciences, University of Tsukuba, 1-1-1 Ten-noda, Tsukuba, Ibaraki 305-8572, Japan. Tel: +81-29-853-6647; E-mail: mktuji@geoenv.tsukuba.ac.jp

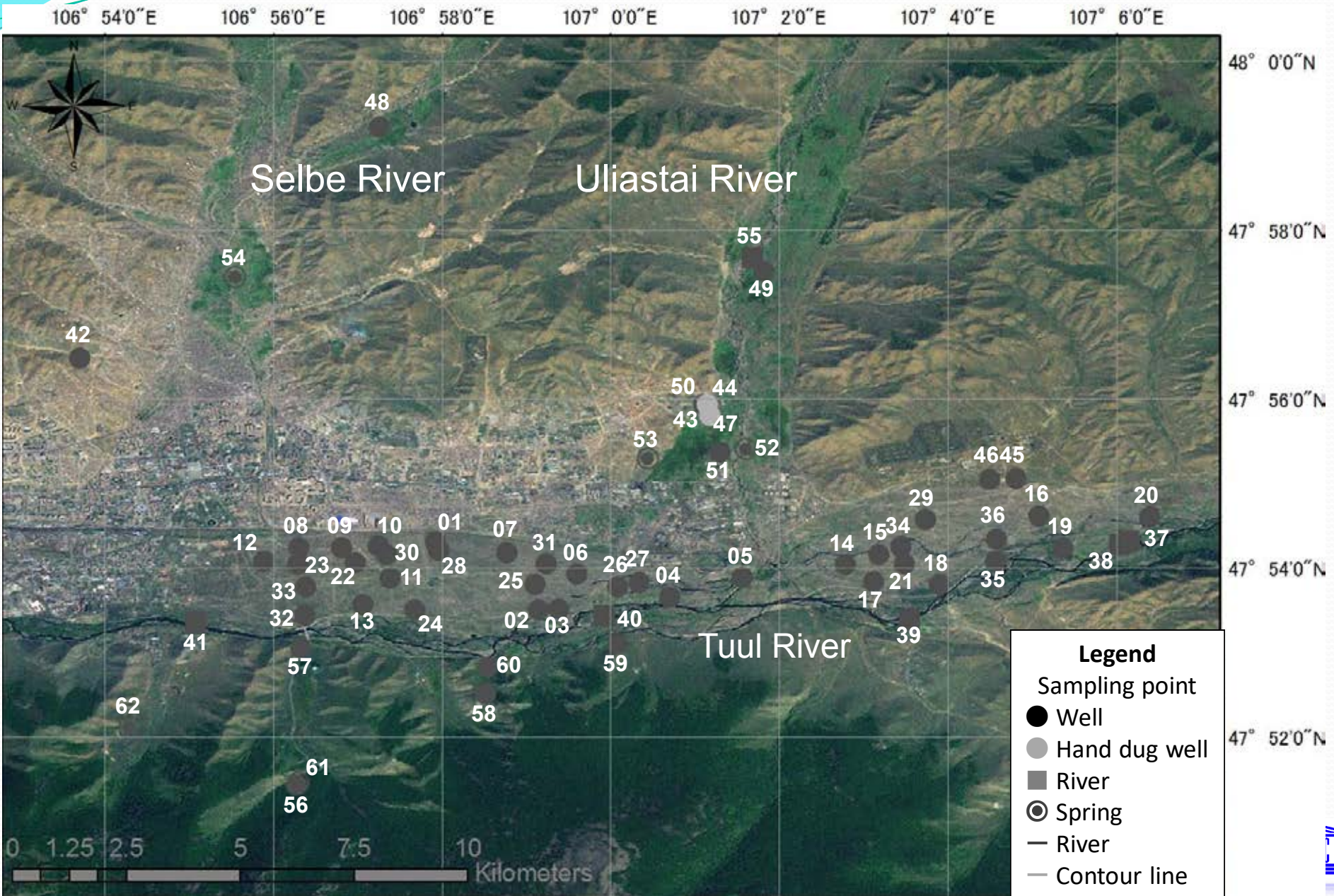
Received: October 30, 2012 Accepted: January 20, 2013

Major Activities

- **6th Asian G-WADI and 1st IDI Expert Group Meeting**, Advances in Groundwater Management & New Tools and Strategy for Coping with Droughts, 13th - 16th June 2015, Tehran
- UNESCO Intern Scientific Symposium: Sci Tech and Policy Innovation for Improved Water Quality Monitoring in the Post-2015 SDGs Framework, Univ Kyoto, 15th - 18th, June 2015
- Training Workshop on “Advances in Water Resources Management in Arid and Semi-Arid Areas: A G-WADI Approach”, Water Research Center, Univ Khartoum, Sudan, 17th-18th Feb, 2016



Ulaanbaatar capital city and wells of drinking water source



Hydro-geological cross section of floodplain in

Altitude (m)

A' Tuul River, Ulaanbaatar

A

Tuul River

Gravel and sand





First Aquifer

Sand and sand loam

Clay

Loam and sand

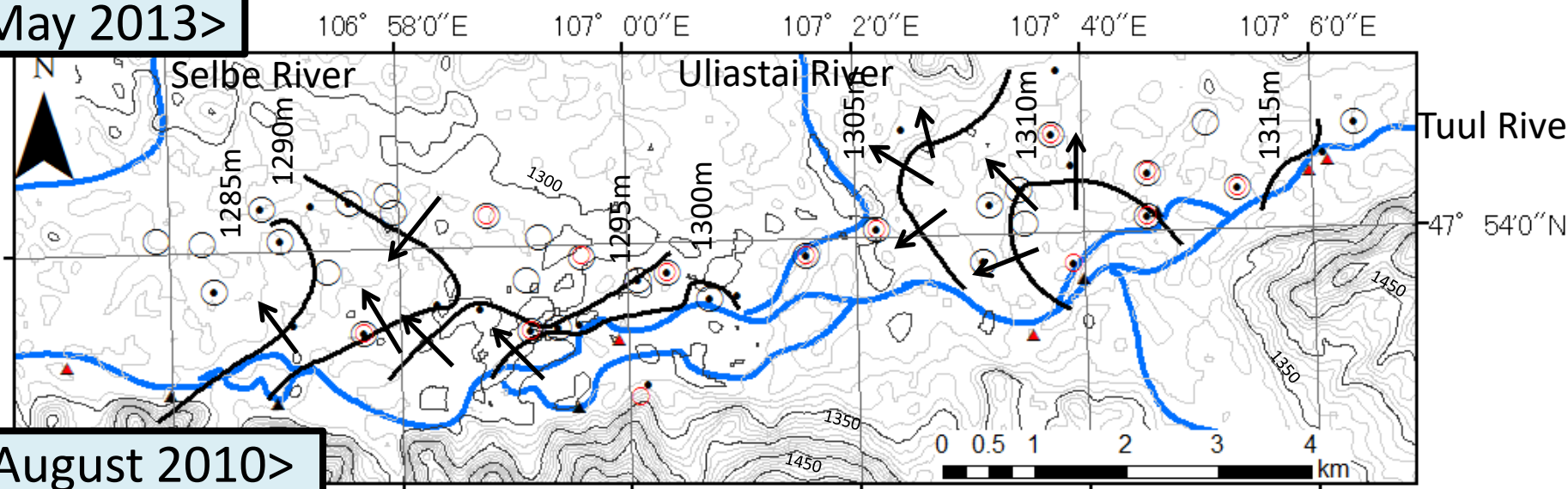
Second Aquifer

	Gravel and sand
	Sand and sand loam
	Loam and sand
	Clay



Spatial Distribution of Hydraulic Head of Groundwater

<May 2013>



<August 2010>

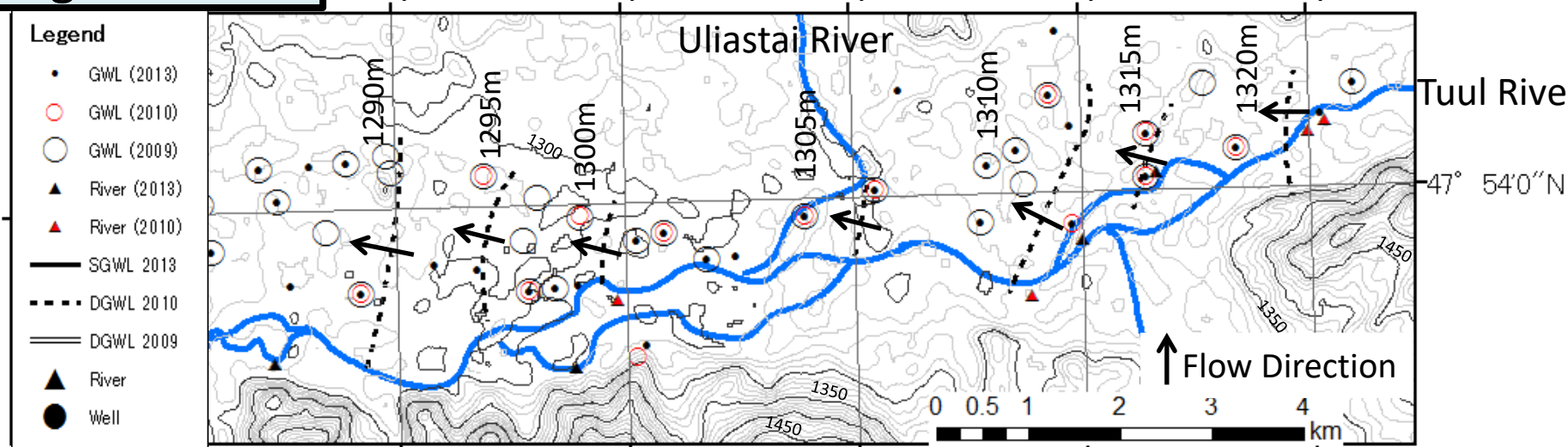
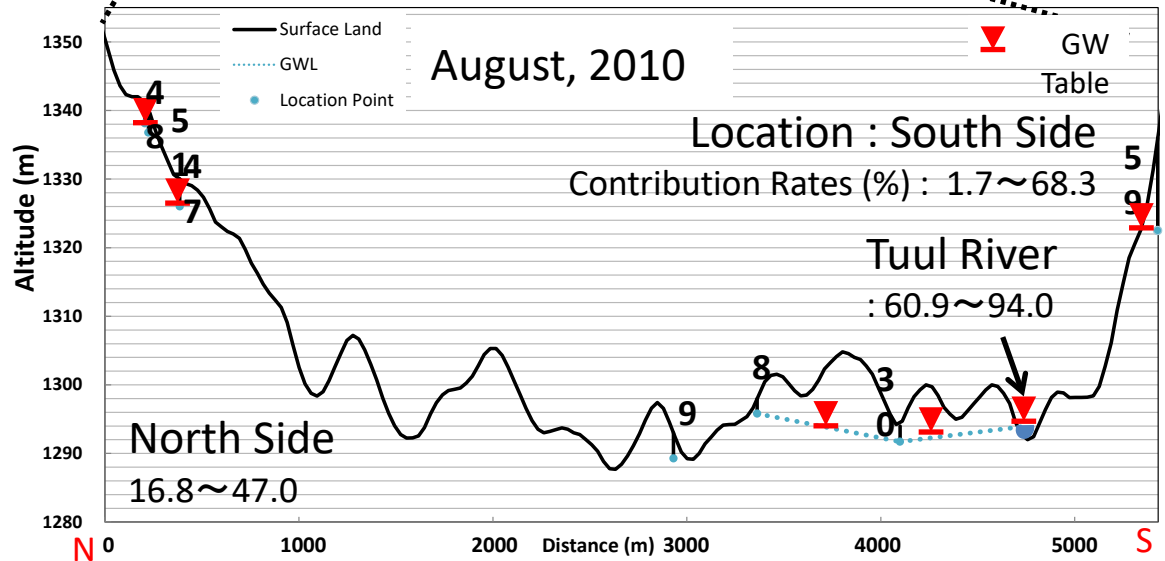
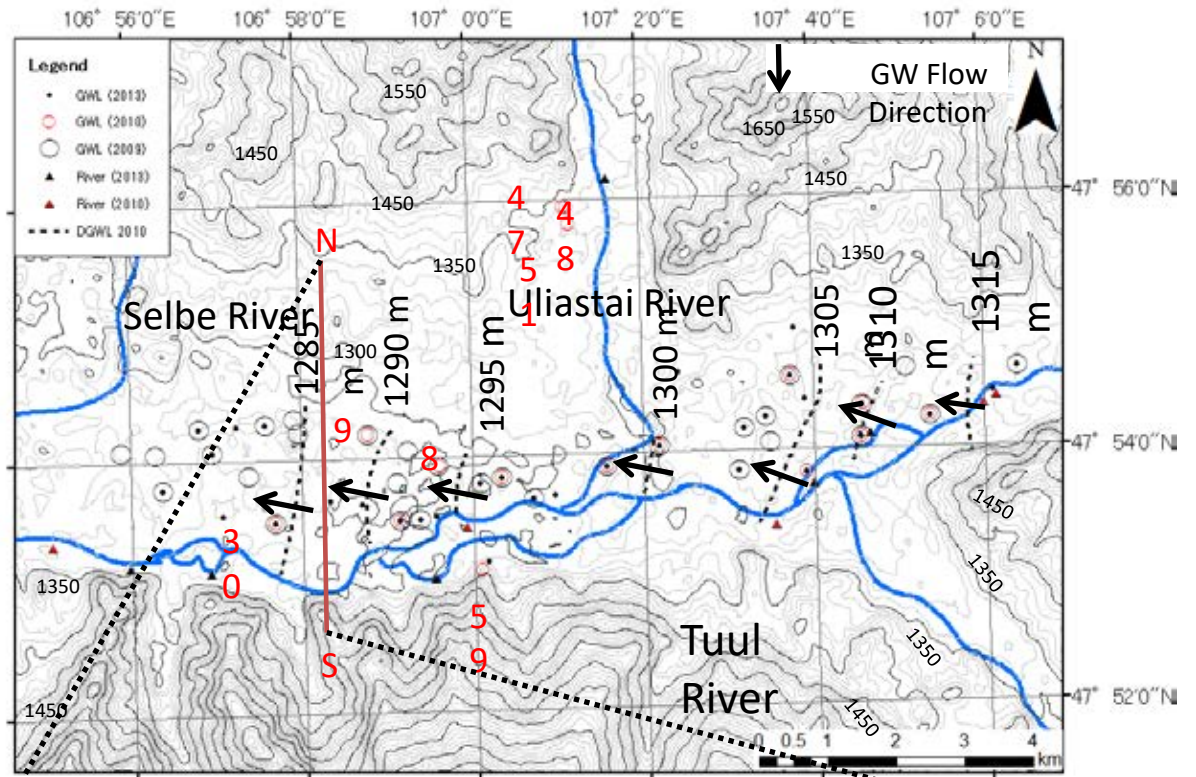


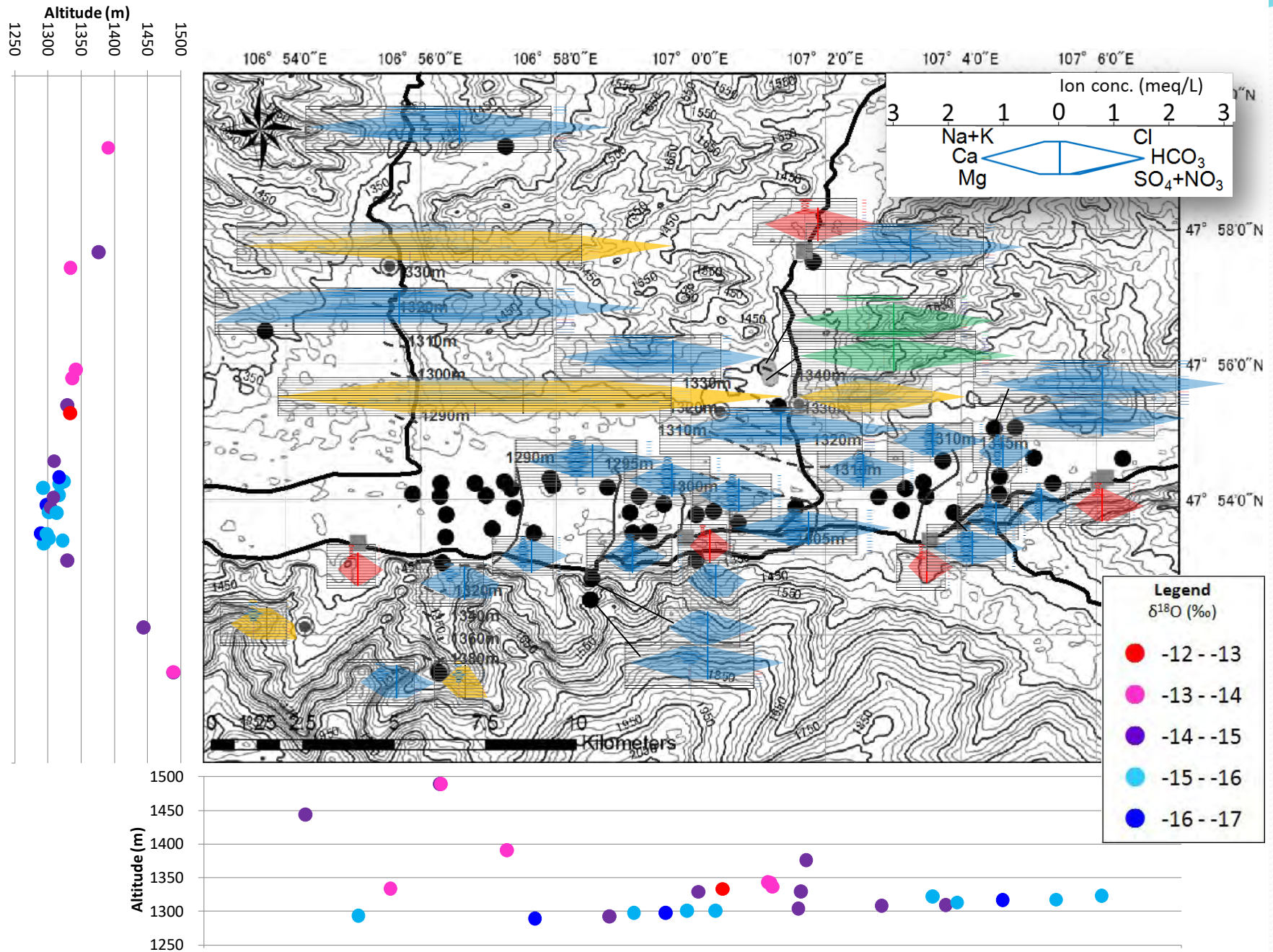
Fig. Spatial distribution of groundwater flow lines to be based on observed GW level

Floodplain GW table was lower in spring season (May 2013) than that in summer season (August 2013)

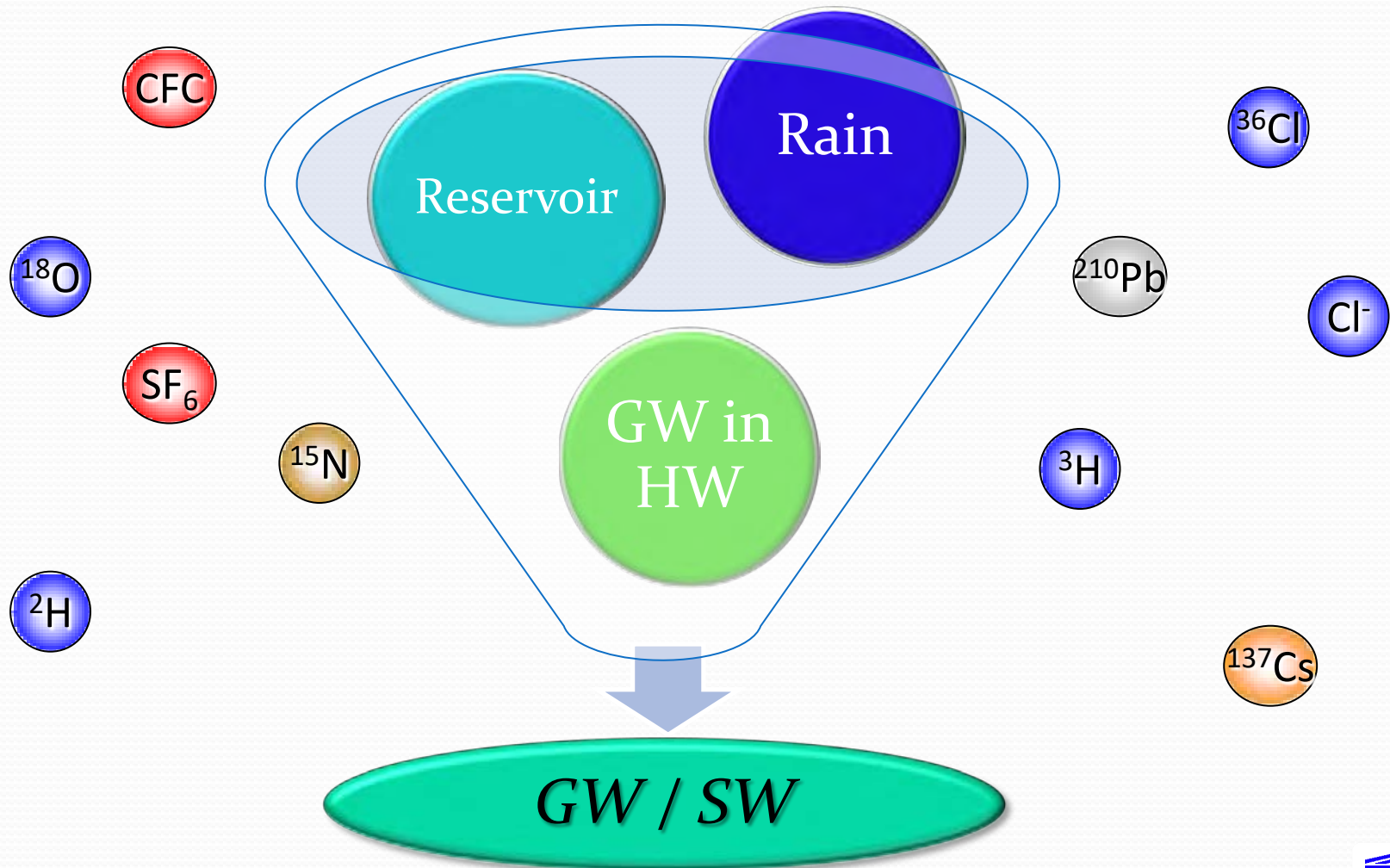
GW & SW Level



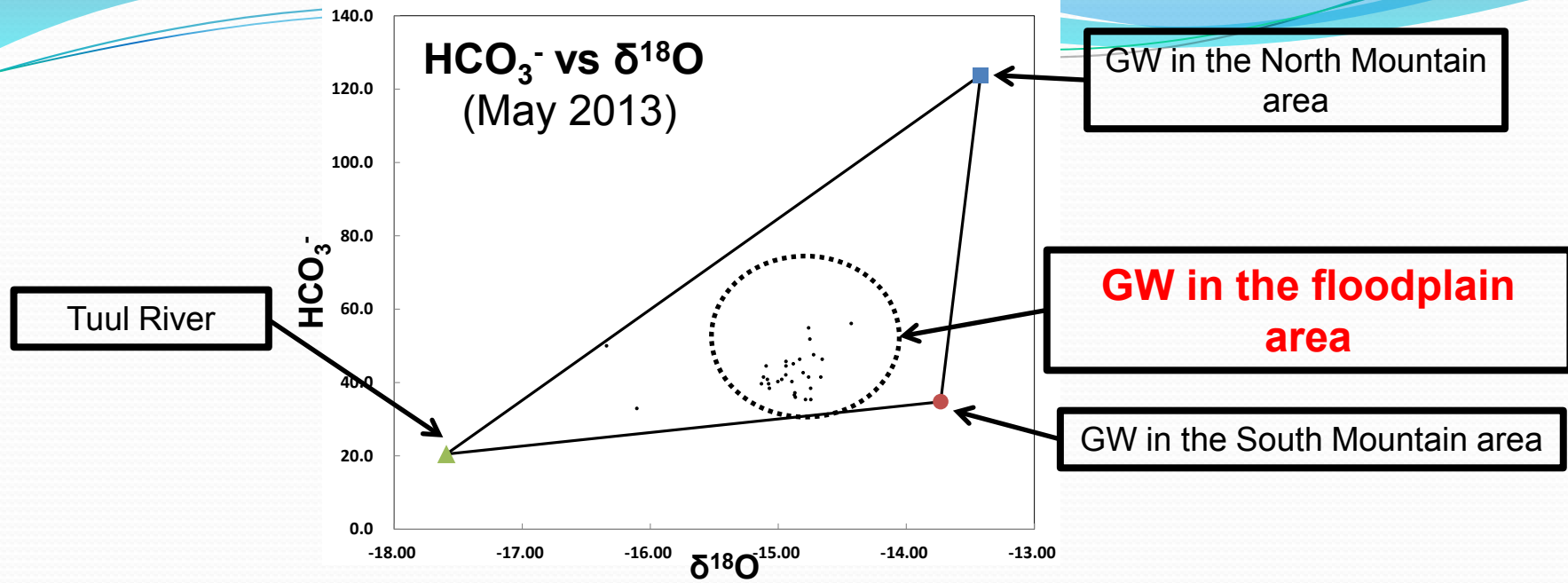
Quality Characteristics in Water



Source of Water: Isotope Tracer End Member Mixing Analysis (EMMA)



End Member Mixing Analysis (EMMA)



EMMA

Contribution to GW in Floodplain area

$$f_a + f_b + f_c = 1$$

$$f_a C_a^1 + f_b C_b^1 + f_c C_c^1 = C_x^1$$

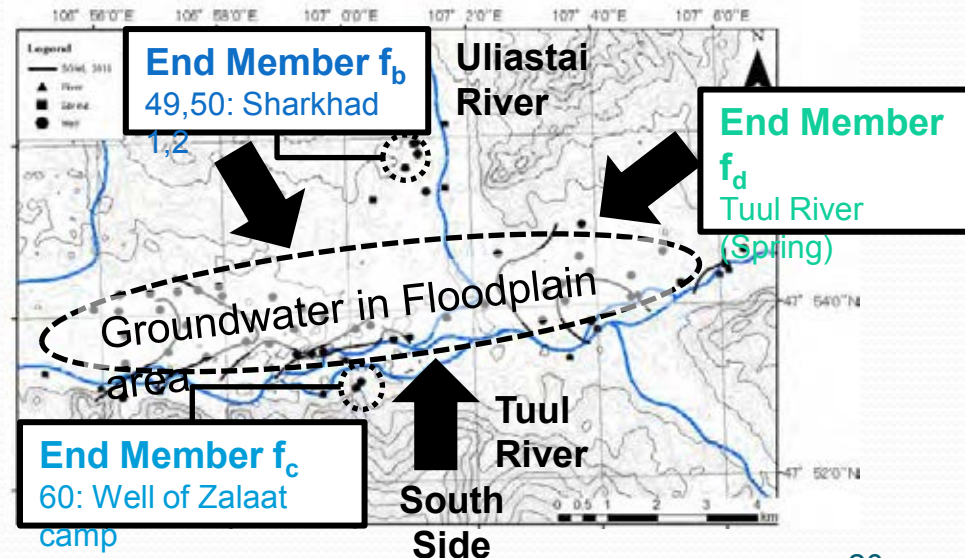
$$f_a C_a^2 + f_b C_b^2 + f_c C_c^2 = C_x^2$$

End member (a, b, c)

North, South, Tuul River (Spring)

Tracer (C¹, C²)

δ¹⁸O, HCO₃⁻



Contribution of SW in GW Recharge (August 2009)

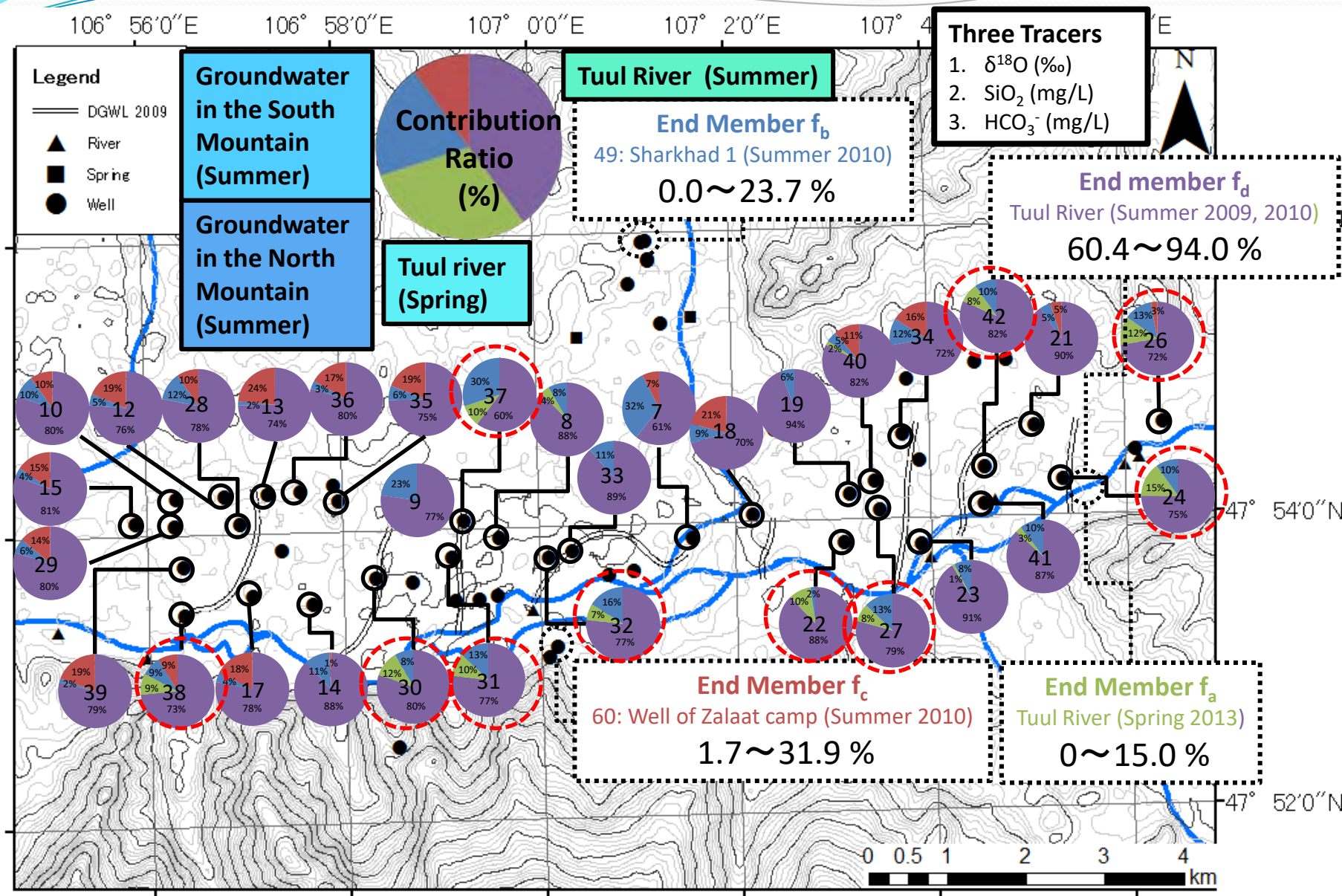


Fig. Spatial Distribution of EMMA (August 2009)

<Source of Groundwater by EMMA>

Spring season (May 2013)

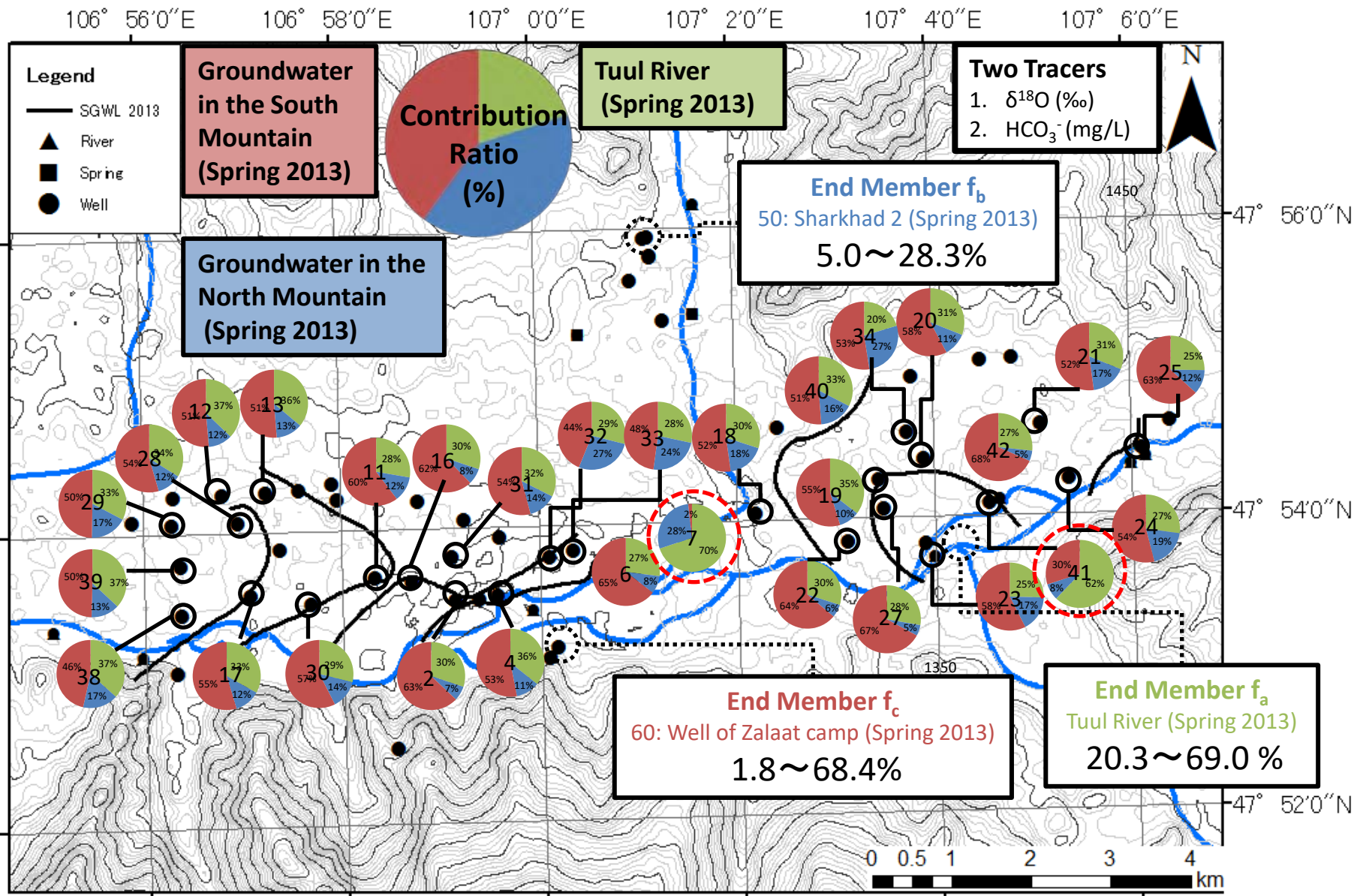


Fig. Spatial Distribution of EMMA (May 2013)

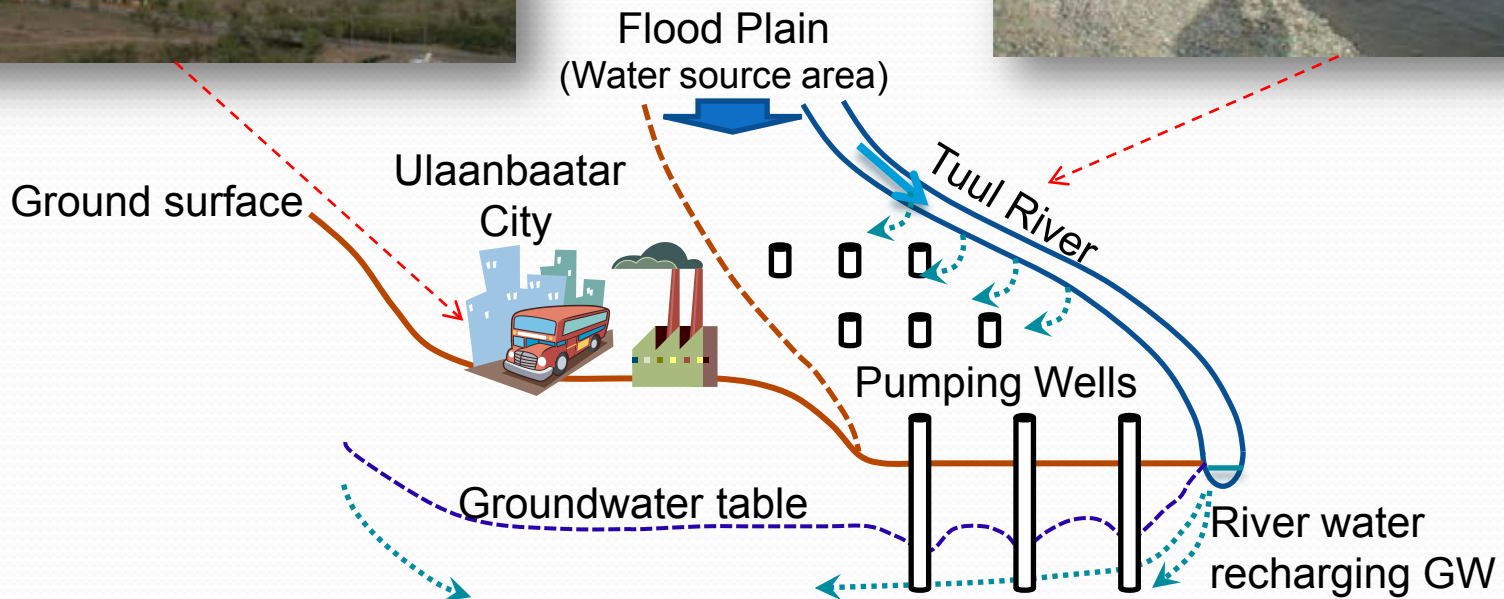
Mongolia

River water recharging groundwater for drinking



Why groundwater than river water?

- *Larger storage*
- *Longer residence time*
- *But need longer time for recovery*



Japanese Governance of Groundwater

Basic Law of Water Cycle (2014)

Basic Law of Environment (Quality Standard of Groundwater)

Land Subsidence

- Industrial Water Law
- Building Water Law
- Purchase for exploitation (Tokyo)

Waste

- Waste Treatment Law

Resource Management

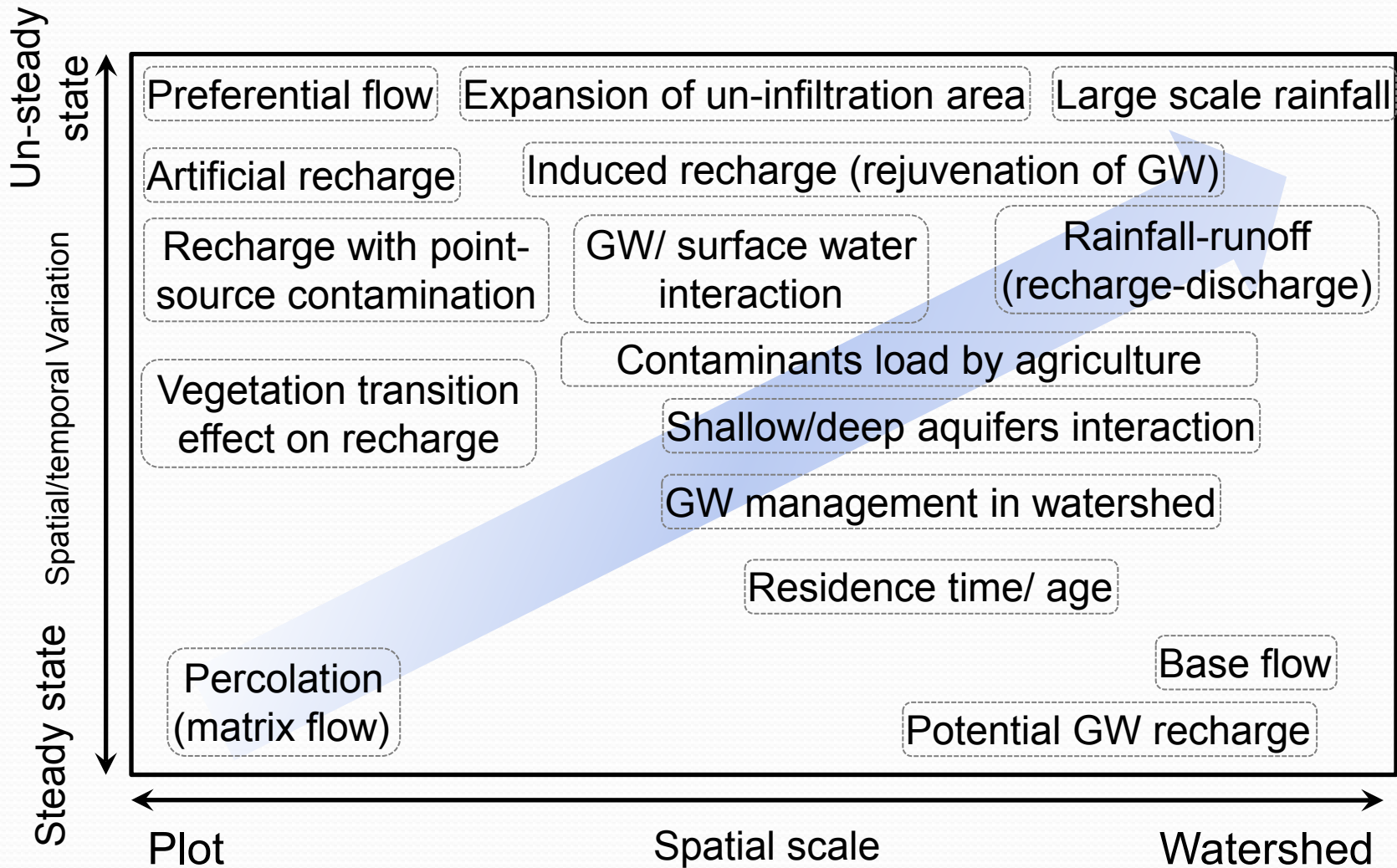
- Law of Hot Spring
- Law of Mining
- Law of Public Use in Underground Space
- River Law
- Law of Erosion Control
- Ordinance by Local Government

GROUNDWATER

Water Quality & Contamination

- Water Quality Conservation Law
- Law of Contamination Prevention for Agricultural Land
- Measure Law of Soil Contamination
- Law of Dioxin Contamination
- Regulation Law of Chemical Materials Inspection
- Management Law of Fertilizer
- Management Law of Agricultural Chemicals

Summary

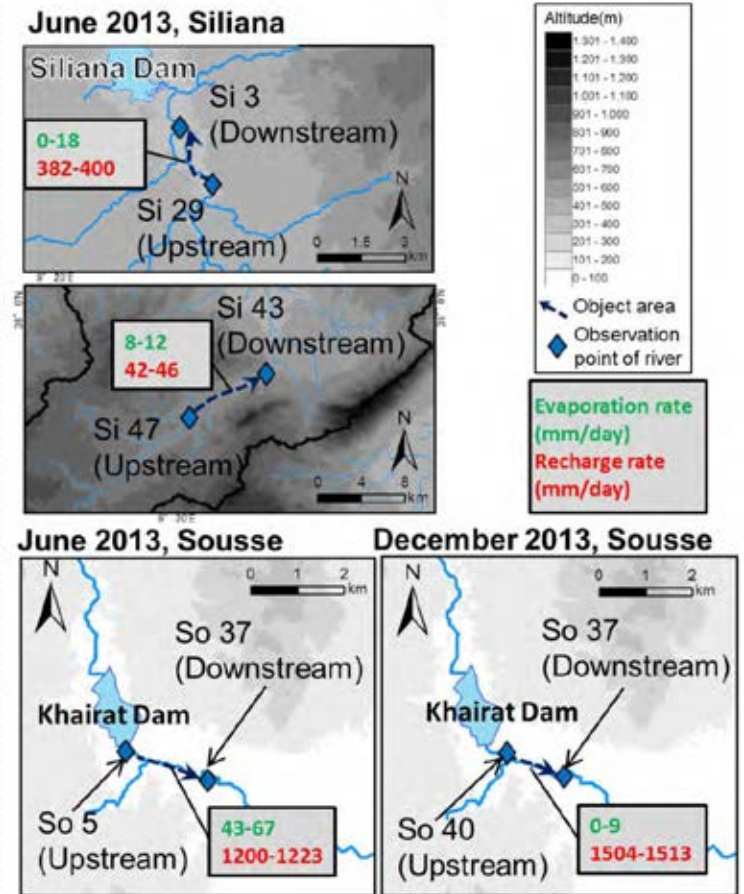
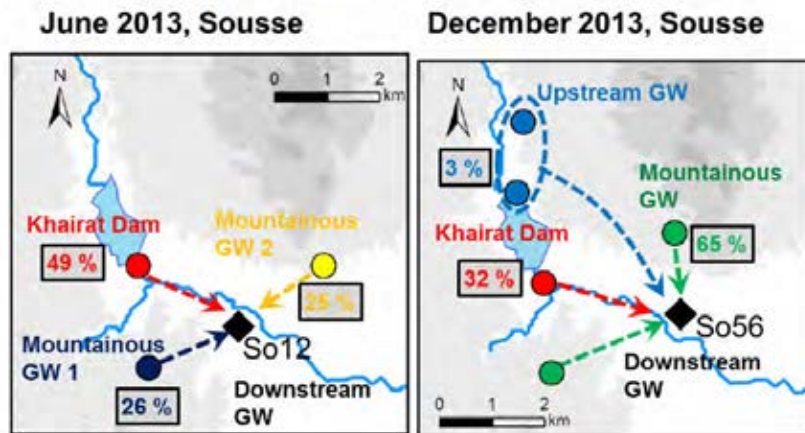
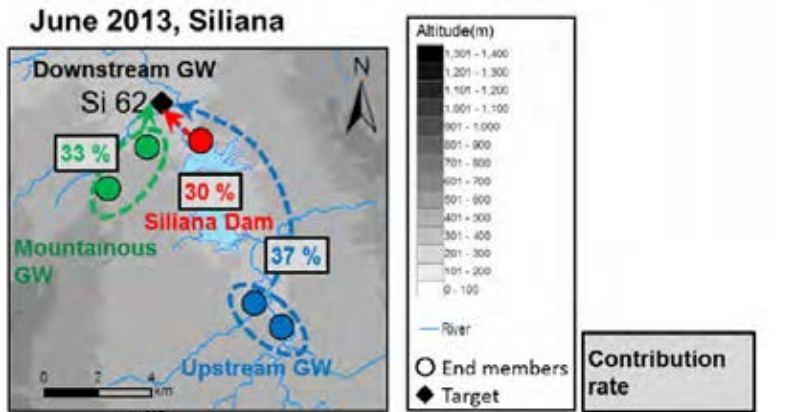


Summary and Appreciation

- Surface water is important as a source of groundwater recharge in arid and semi-arid regions
- GW/SW cycle system should be considered for Sustainable Integrated Water Management in quality and quantity
- Monitoring of GW should be conducted at certain locations considering GW/SW interaction
- Sustainable yield/ safe yield of borehole in quality and quantity should be discussed based on GW flow system
- Appreciation
 - UNESCO-Chair on Sustainable Groundwater Management in Mongolia -- Dr. Jayakumar, UNESCO
 - JICA-JST SATREPS (Science and Technology Research Partnership for Sustainable Development) -- Prof. Isoda, UT
 - JSPS Grant in Aid for Scientific Research, No. 23401002 “Groundwater and surface water interaction in semi-arid regions”



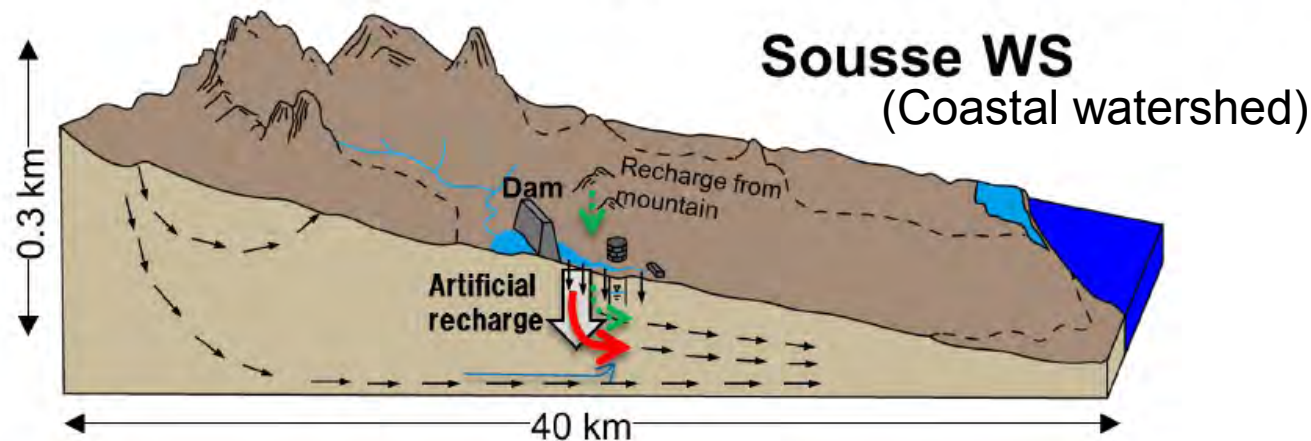
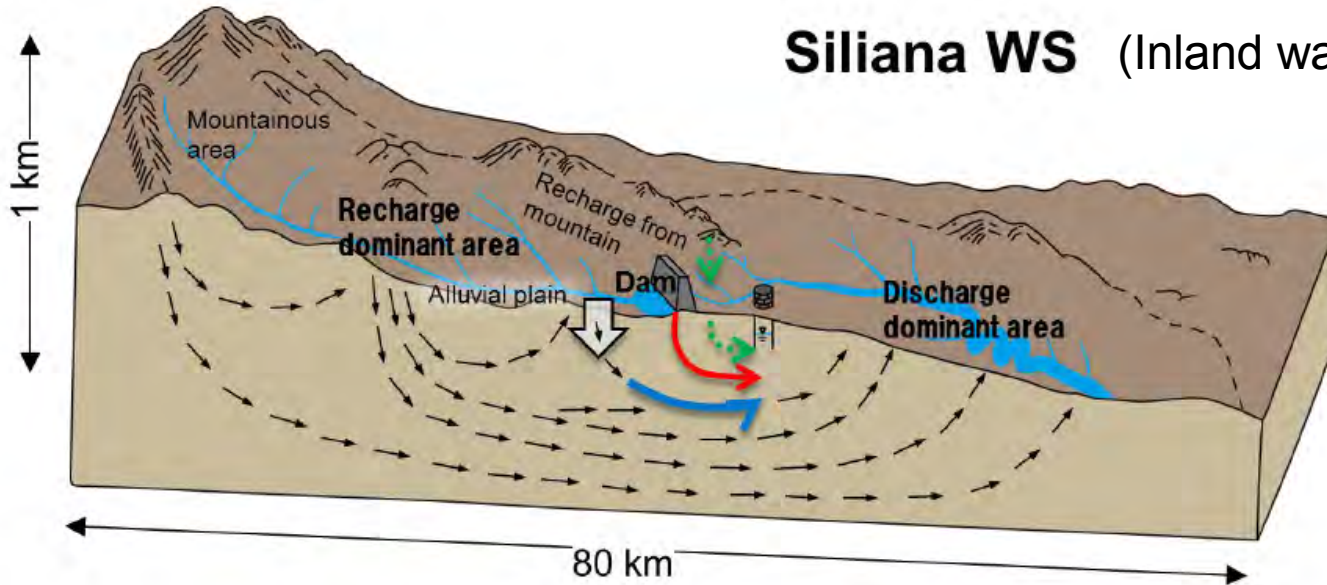
Surface Water Recharging Groundwater (Siliana, Sousse)



Contribution ratio of dam to groundwater recharge

Recharge rate by dam water

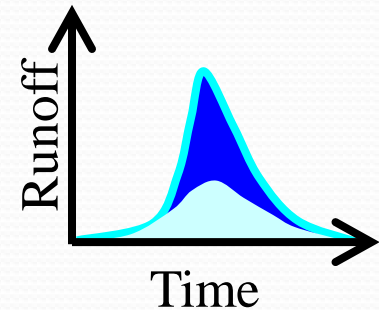
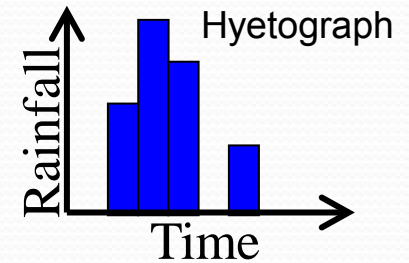
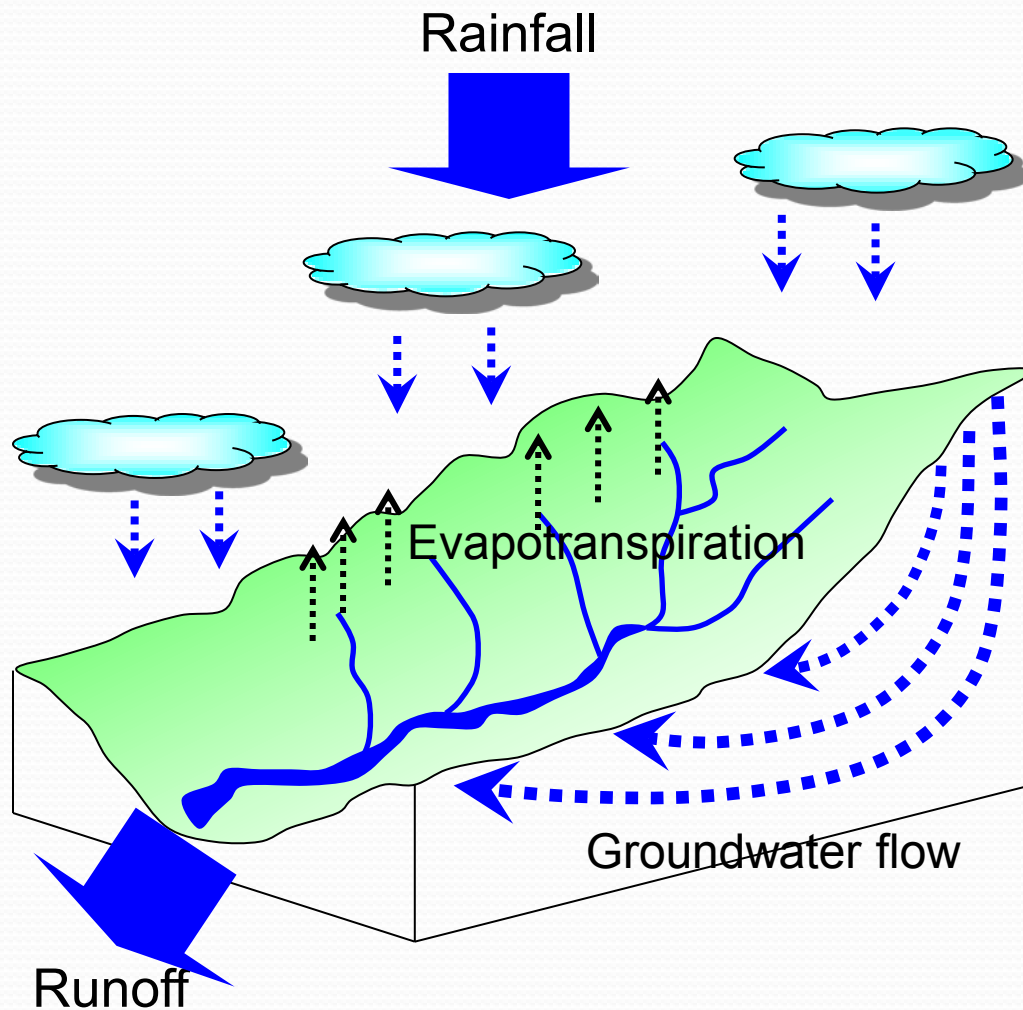
Hydrological Cycle



- GW flow
- Dam water
- Mountainous GW
- Upstream GW
- ⇩ Recharge from river

Where does water come from?

What is source of GW/ SW?



GW Contour Map showing GW Flow

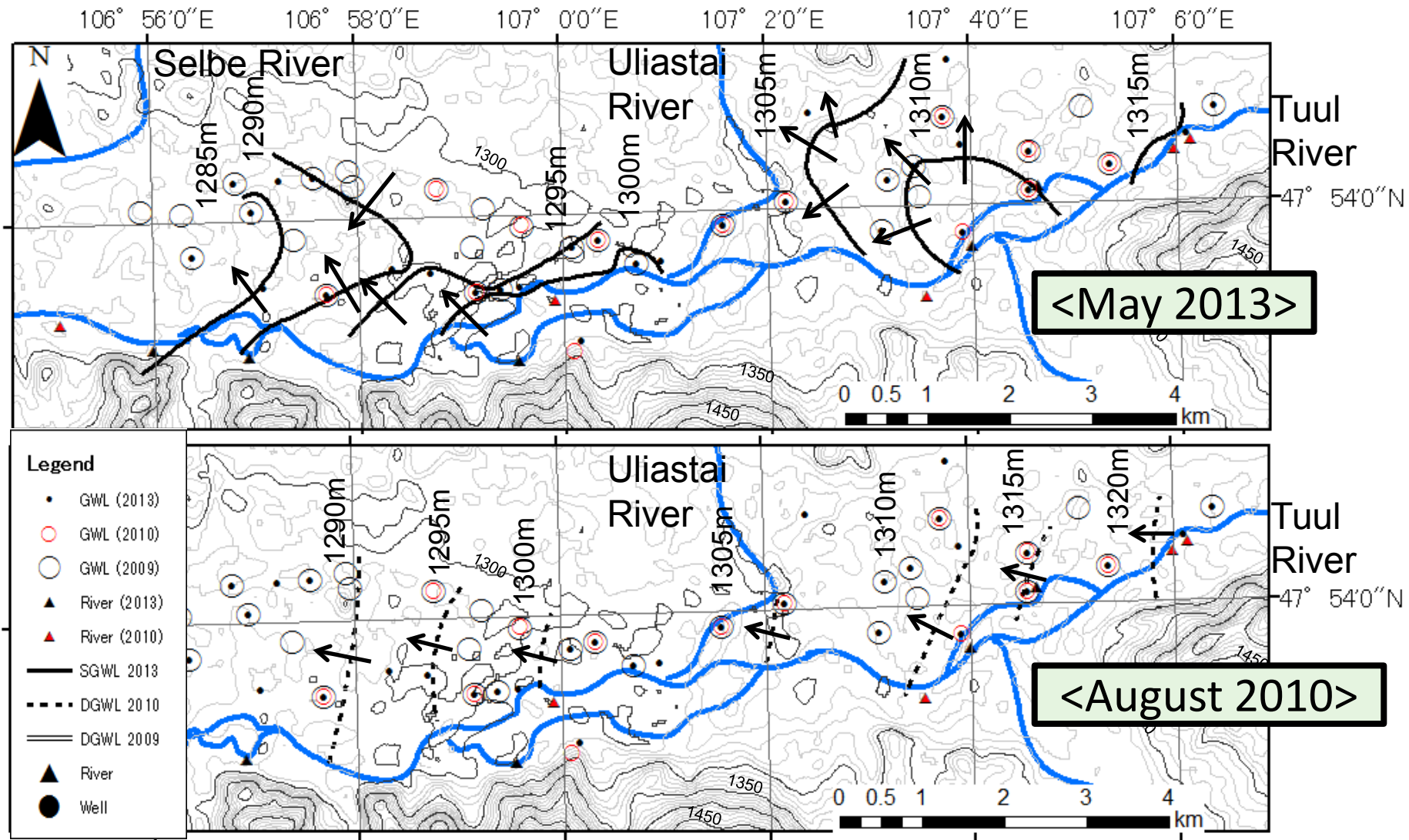


Fig. Spatial distribution of groundwater flow lines to be based on observed GW level (May 2013 and August 2010)

河畔域地下水における各成分の寄与率 (May 2013)

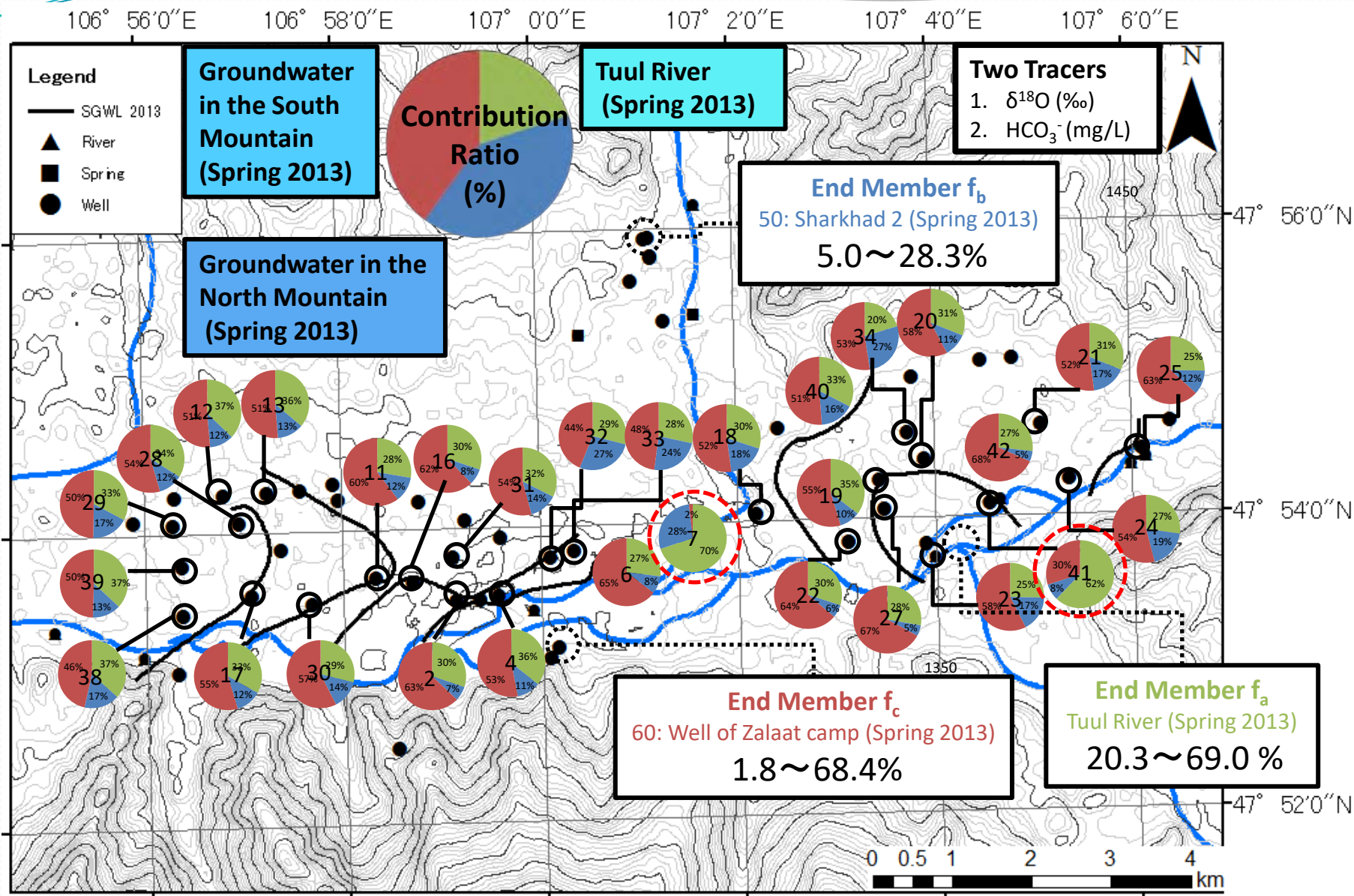
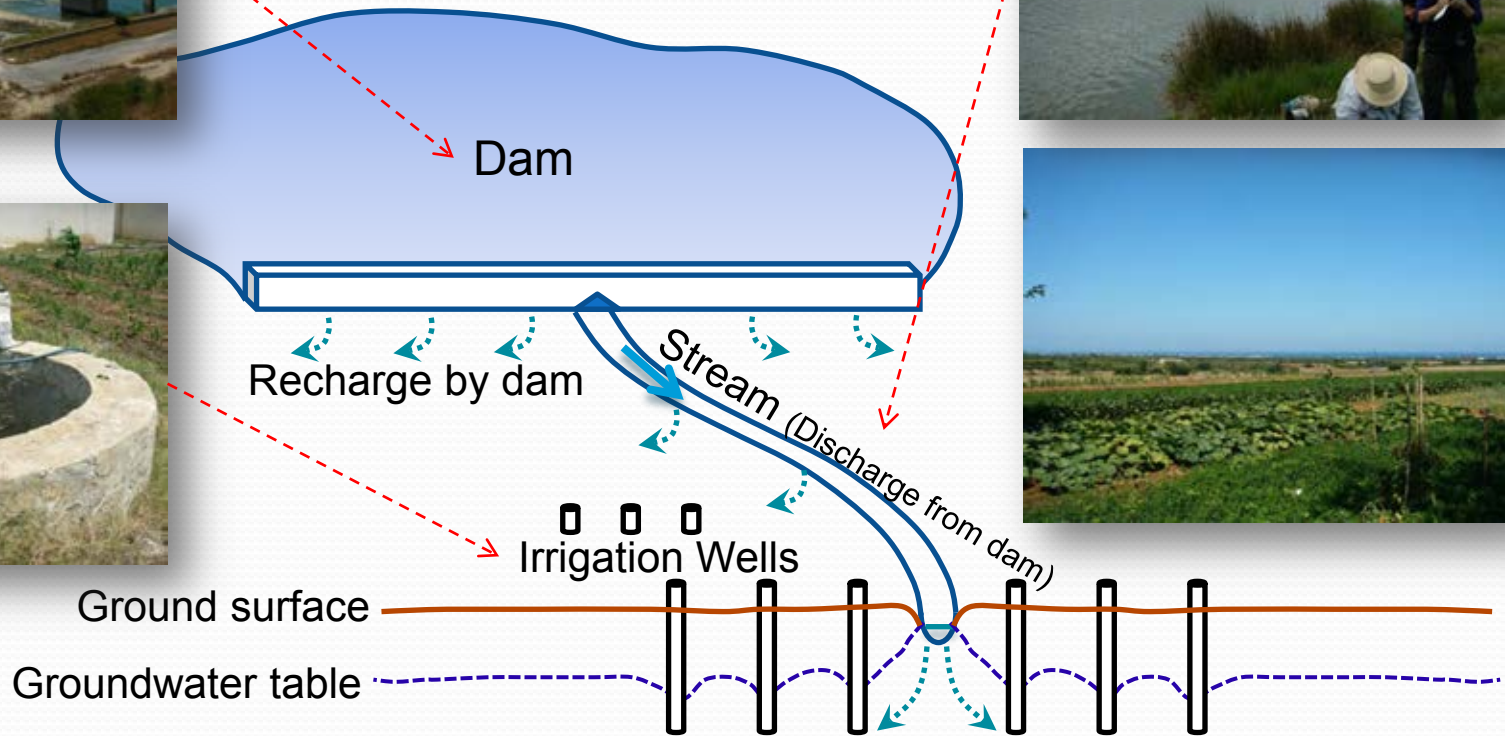


Fig. Spatial Distribution of EMMA (May 2013)

Dam Water Recharging Groundwater for Irrigation

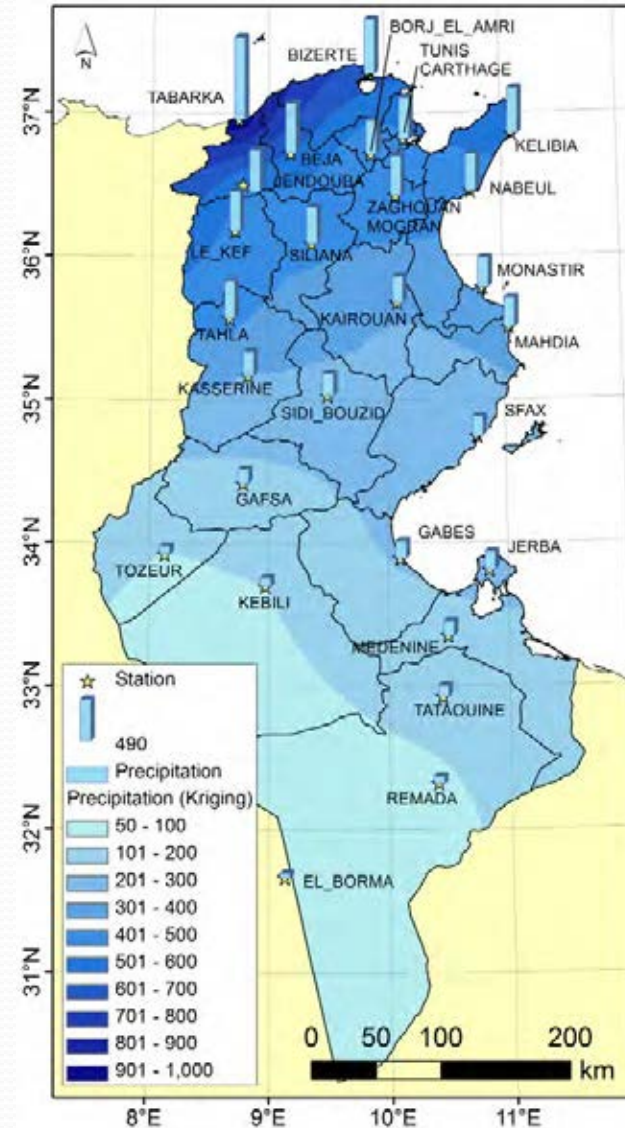
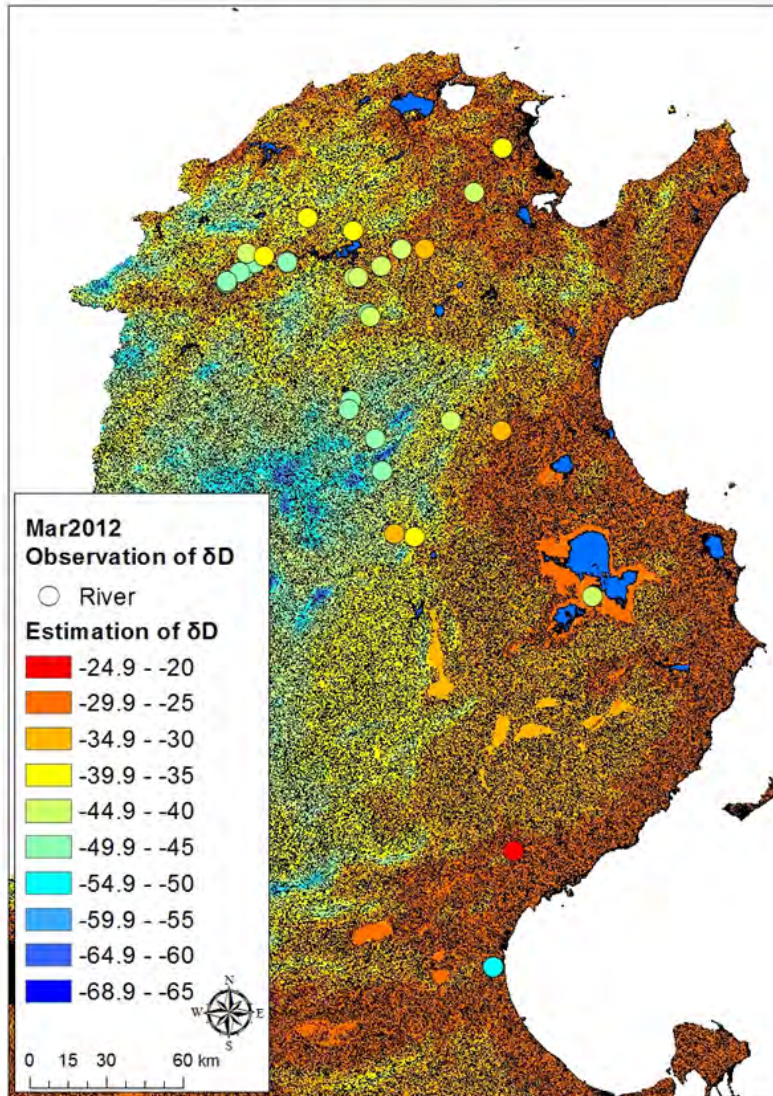


Dam water irrigating crops; apples, tomatoes, olive via groundwater



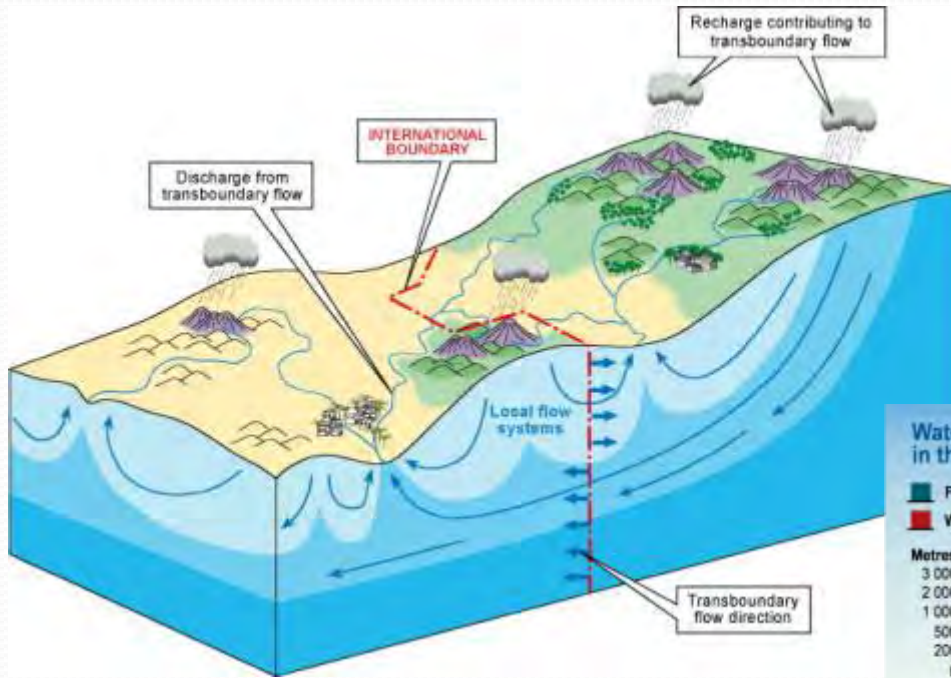
River water recharging GW

Spatial Distribution of Deuterium



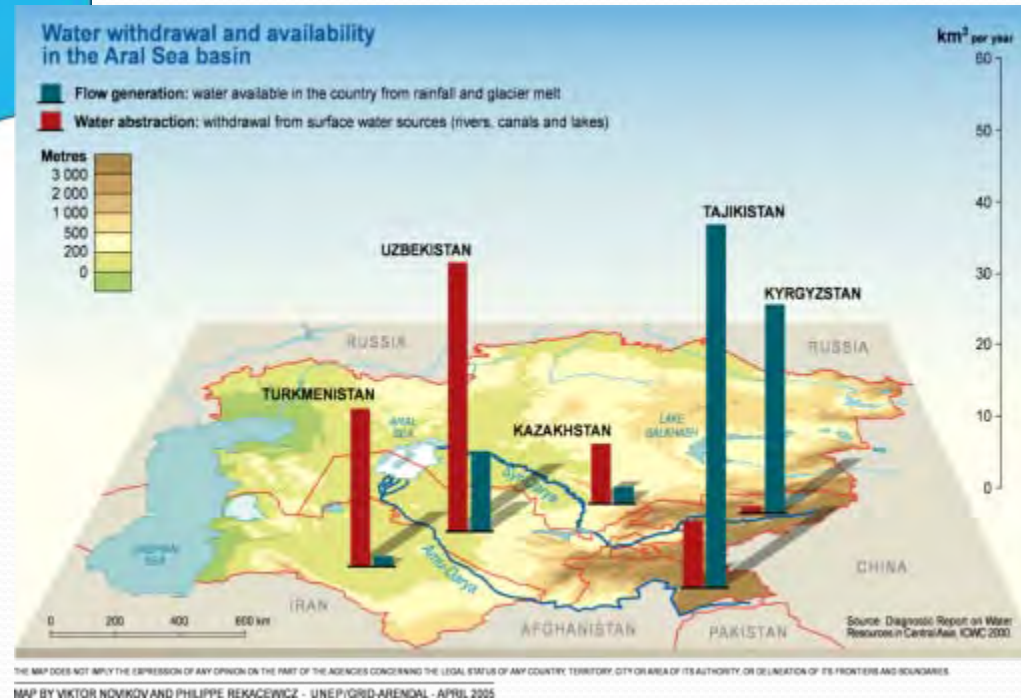
Integrated Transboundary Water Issues

-Surface Water and Groundwater-



Groundwater transboundary aquifer
(International Shared (Transboundary)
Aquifer Resources Management, UNESCO-
IHP, 2001)

Unbalance of Intern river issues
(Diagnostic Report on Water Resources in
Central Asia, ICWC, 2000)



2009/8/12



2009/8/13




2010/8/24

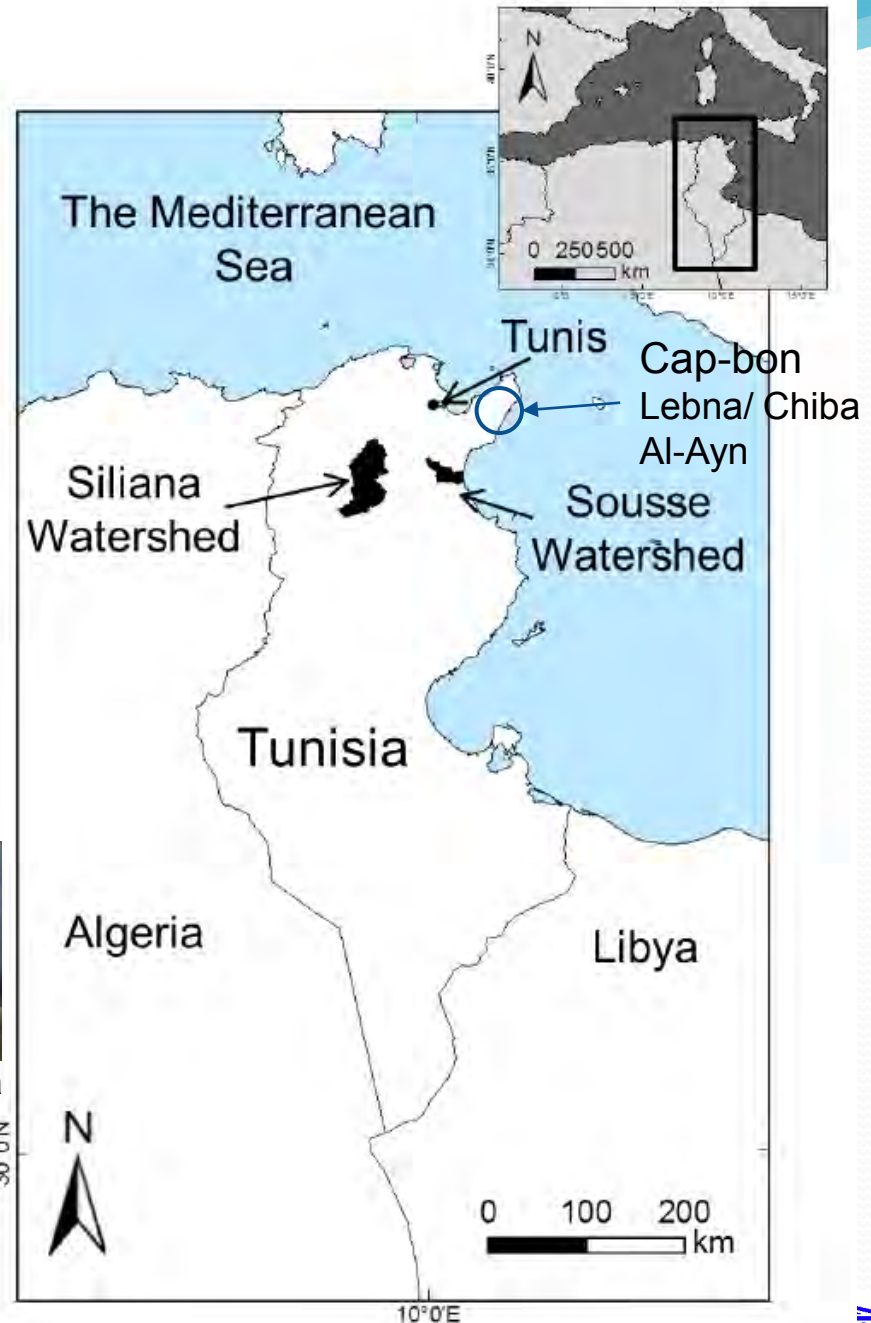


2010/8/25



Tunisia

- One of the most vulnerable area to climate change
 - Depending on GW 75% & SW 25%
 - Ann Prec
 - > 500 mm/y in north
 - < 100 mm/y in south
- 
- Recharge by reservoir



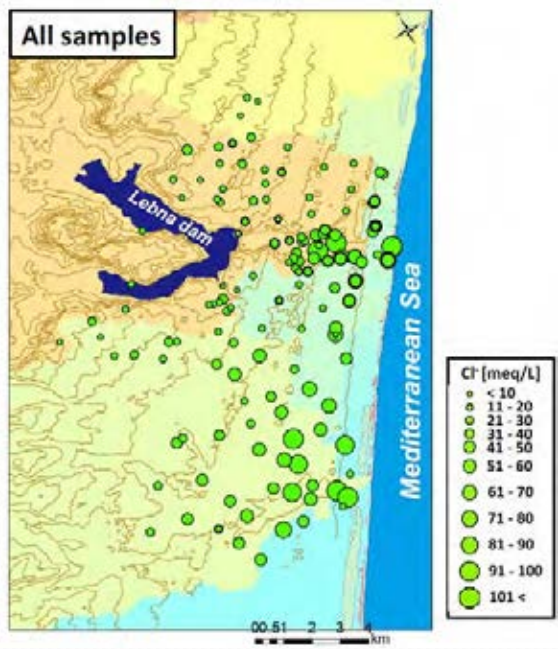
Dr Chekirbane Mr Shibayama Ms Furukawa Ms Takahashi Mr Yamada



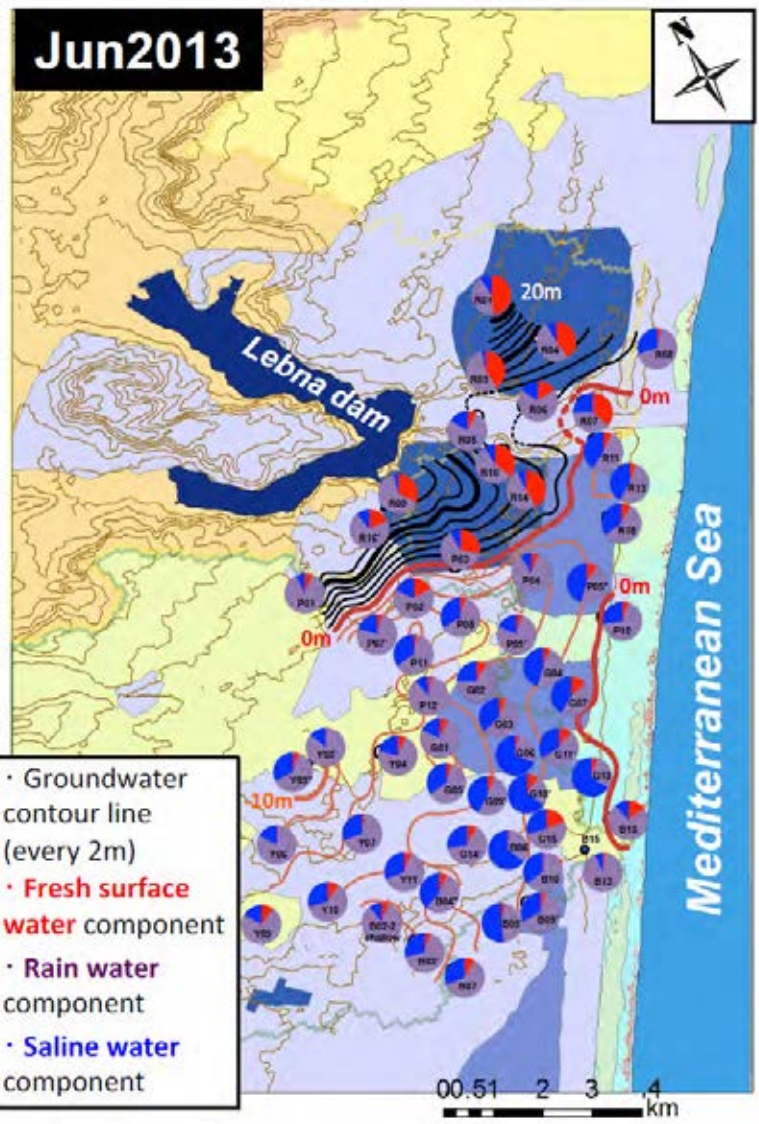
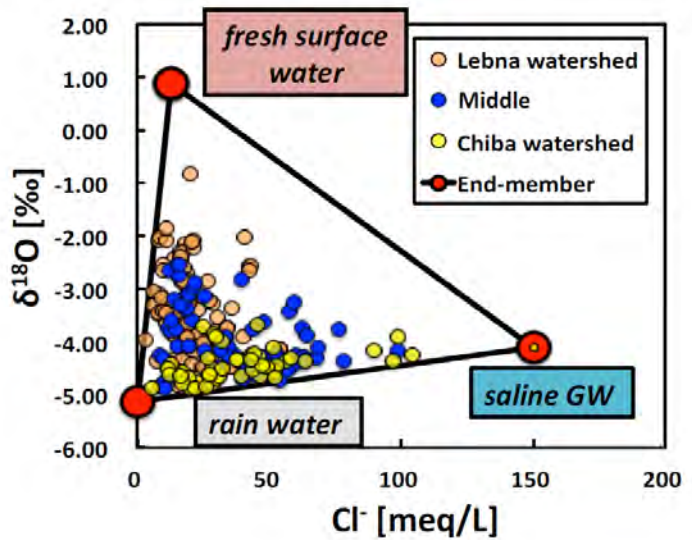
Dr Kawachi

Role of Dam in Groundwater Recharge

Lebna, Chiba; Cap-Bon

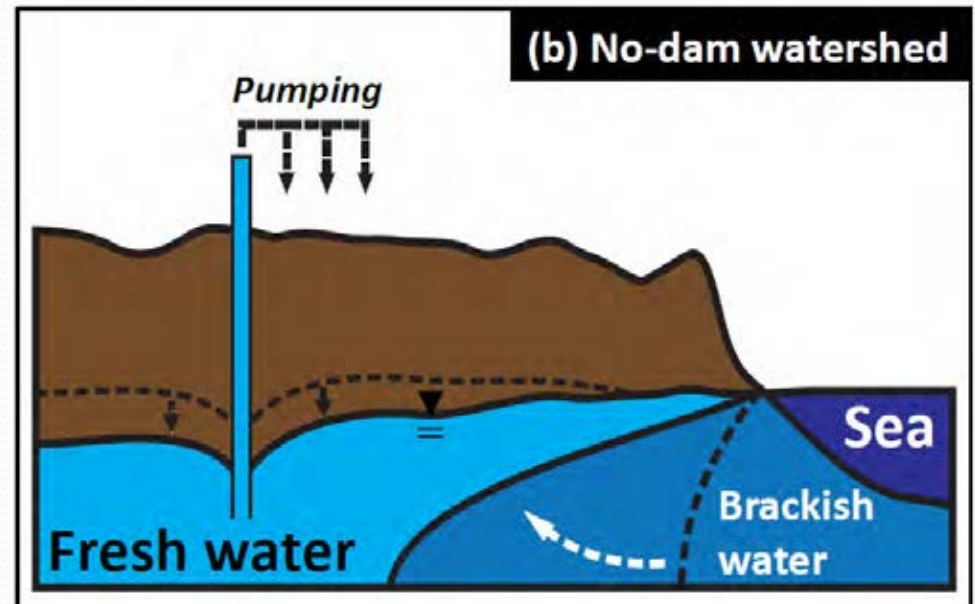
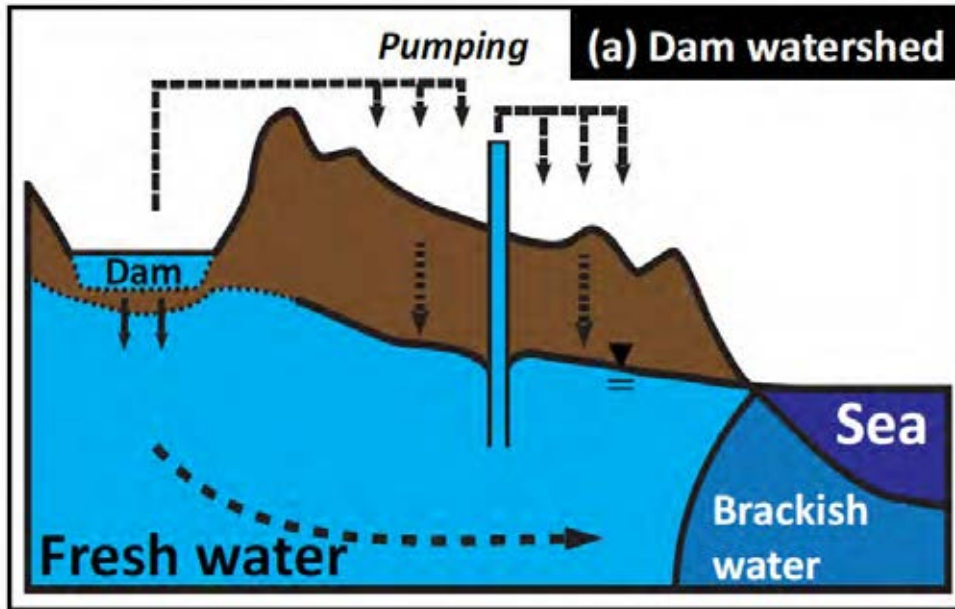


Chloride concentration in groundwater



Contribution ratio of end members to groundwater recharge

Role of Dam in Groundwater Recharge



Using IWRM for Better Infrastructure: Case Study from Canterbury, New Zealand

Dennis Jamieson

25 October 2016

Themes

- **Peace** – UNESCO purpose! (*“Building peace in the minds of men and women”*): Water and conflict in Canterbury
- **Role of infrastructure**: High Government priority
 - A “crisis”: Better practices needed
 - What is infrastructure?
- **Mobilisation of Science**
 - Social and biophysical Science via IWRM
- **Focussing on outcomes**
 - Constantly updating (e.g. Ecohydrology)

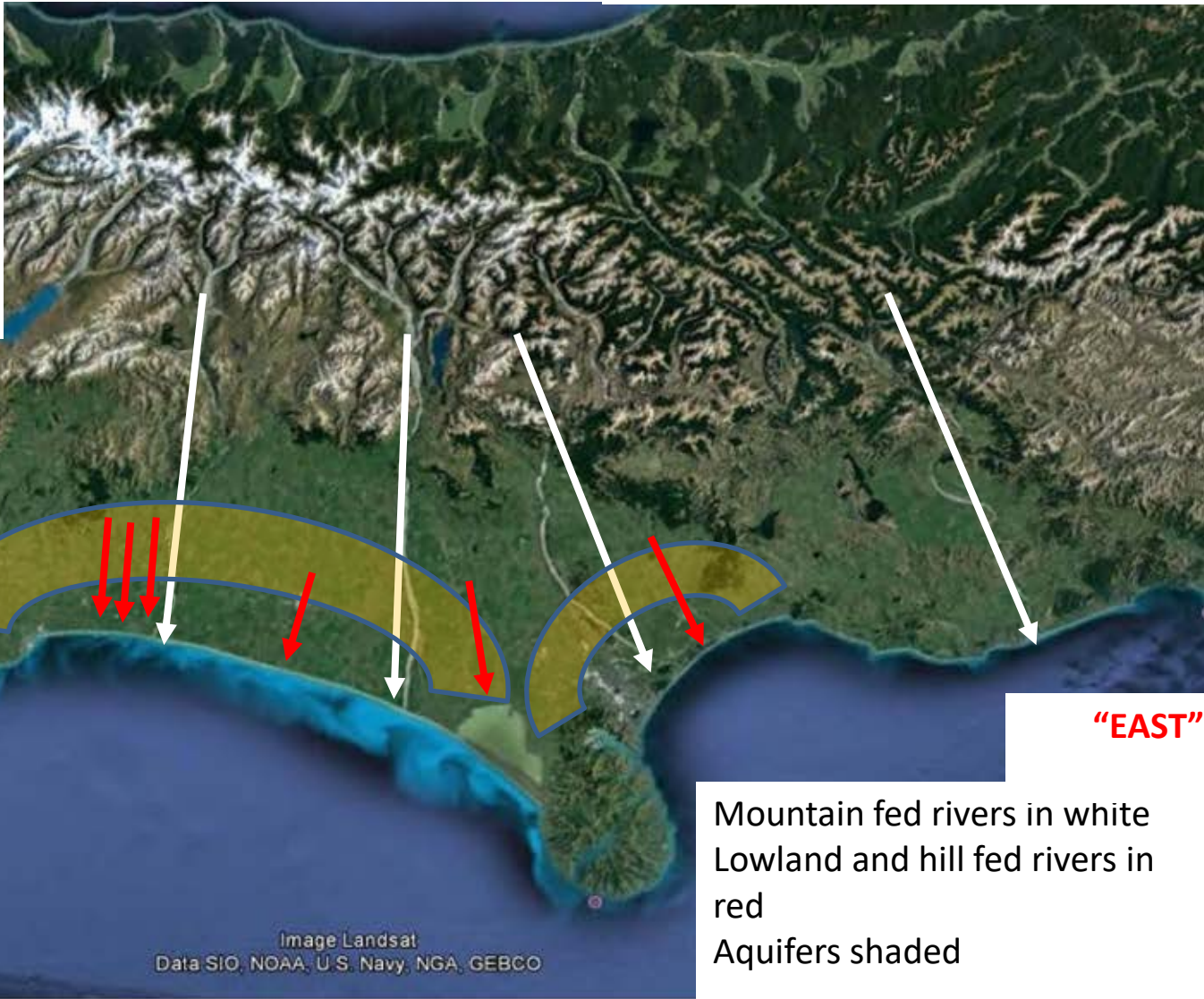
Water and conflict

Canterbury

- Abundant water = complacency
- “Crisis” by 2010 driven by irrigation expansion
 - Small rivers/Aquifers over used (easy to access)
 - Large rivers relatively lightly used
 - Declining water quality (diffuse source pollution)
- Canterbury councils (Local Government) endorsed an IWRM type approach – the CWMS (↑ = reduced conflict)
- Includes participation of interests previously marginalised – such as indigenous people
- Central Government intervened to replace democratically elected Councillors in 2010 (↓)
- 2016 – mix of elected and government appointed Councillors (↑)
- So, as elsewhere, water is a potential source of conflict.

Canterbury

High mountains capture rain from the West. Therefore relatively abundant flows in rivers with mountain catchments that flow to the East



Groundwater aquifers and lowland and hill fed rivers have been overused, while large rivers have capacity to provide more water – especially with use of

Mountain fed rivers in white
Lowland and hill fed rivers in red
Aquifers shaded



Some forces still foster conflict including...

- Special interest groups that feel they can gain more by working alone and using their influence/resources
- Media:

Radio NZ 14 October 2016

*“The **battle lines** are drawn around the table at the newly elected Canterbury Regional Council (ECan). **On one side** sit those with strong farming backgrounds, while **on the other** sit environmentalists.”*

The role of infrastructure

- Large \$\$ gets Government attention!!
- IWRM/CWMS is a critical part of the process to build “*Cases for Change*” and “*Better Business Cases*” for water infrastructure
 - Government Treasury agencies and the Private Sector need this
 - Many failed previous investments hence current recognition of the need for better investment practices

Central government view

- We look at five sectors – **Transport, Energy, Telecommunications, Water (Three Waters and Productive Water) and Social infrastructure.**
- In the three years to June 2014, Government added almost **\$16 billion** of assets to it's books – reflecting investments in areas like roads, rail, ultra-fast broadband, electricity transmission and the Christchurch rebuild.
- **\$939 million** of new capital was invested through Budget 2015.
- The 2015 *Ten-Year Capital Intentions Plan* shows that over the next 10 years, **\$110 billion** will be spent on infrastructure:
 - Central Government: ~\$49 billion
 - Local Government: ~\$47 billion
 - Private sector: ~\$14 billion



NATIONAL INFRASTRUCTURE UNIT

Big \$\$!!

2011 water sectors in detail

Investment Analysis	<ul style="list-style-type: none"> • Long-term, large-scale rural water investments not occurring.
Resilience	<ul style="list-style-type: none"> • Asset performance information largely unavailable.
Funding Mechanisms	<ul style="list-style-type: none"> • Local funding not linked to national standards. • Scope to make better use of metering and pricing.
Accountability & Performance	<ul style="list-style-type: none"> • Asset performance information largely unavailable.
Regulation	<ul style="list-style-type: none"> • The desired regulatory outcome for rural water has not been set.
Coordination	<ul style="list-style-type: none"> • Multiple agencies with water responsibilities. • Competing uses across sectors.



What is infrastructure?

- Not just concrete and steel!
- Capability of Governance, Management and Operations personnel involved in water supply and water use (Private and Public sector)
- Institutions created through IWRM process with community to determine economic and environmental outcomes desired
 - Examples are local groups participating in determining flow regimes with Ecohydrology approaches
- Often behaviour change and efficiency of use (“Demand Reduction”) are better options than building more (expensive!) water supply systems.

OEFRAG

- Opuha (River) Environmental Flow Release Advisory Group.
- Participating in an ongoing, Science-informed process with owners of Opuha Dam to get a downstream flow regime in place that meets community aspirations (Ecohydrology)
- OEFRAG played a vital and constructive role in balancing economic and environmental interest over a very dry summer using local wisdom combined with biophysical science.

OEFRAG: A different type of media story



Since it was commissioned in 1998 the scheme has been reliable but in 2014 inflows from snow-fed mountain streams were too low to keep up with the outflow needed to provide irrigation water as well as required environmental flows for the rivers and to supplement Timaru city's supply.

When it appeared that pattern would be repeated, Opuha Water put irrigation restrictions in place this season - even though the lake was close to full in early spring - fearing the worst because of low inflows. The welcome rain brought relief.

The irrigation company works with the Opuha Environmental Flow Release Advisory Group (Oefrag), which comprises representatives from district councils, farmers, Opuha Water, river users and tangata whenua and makes river flow recommendations to Environment Canterbury.

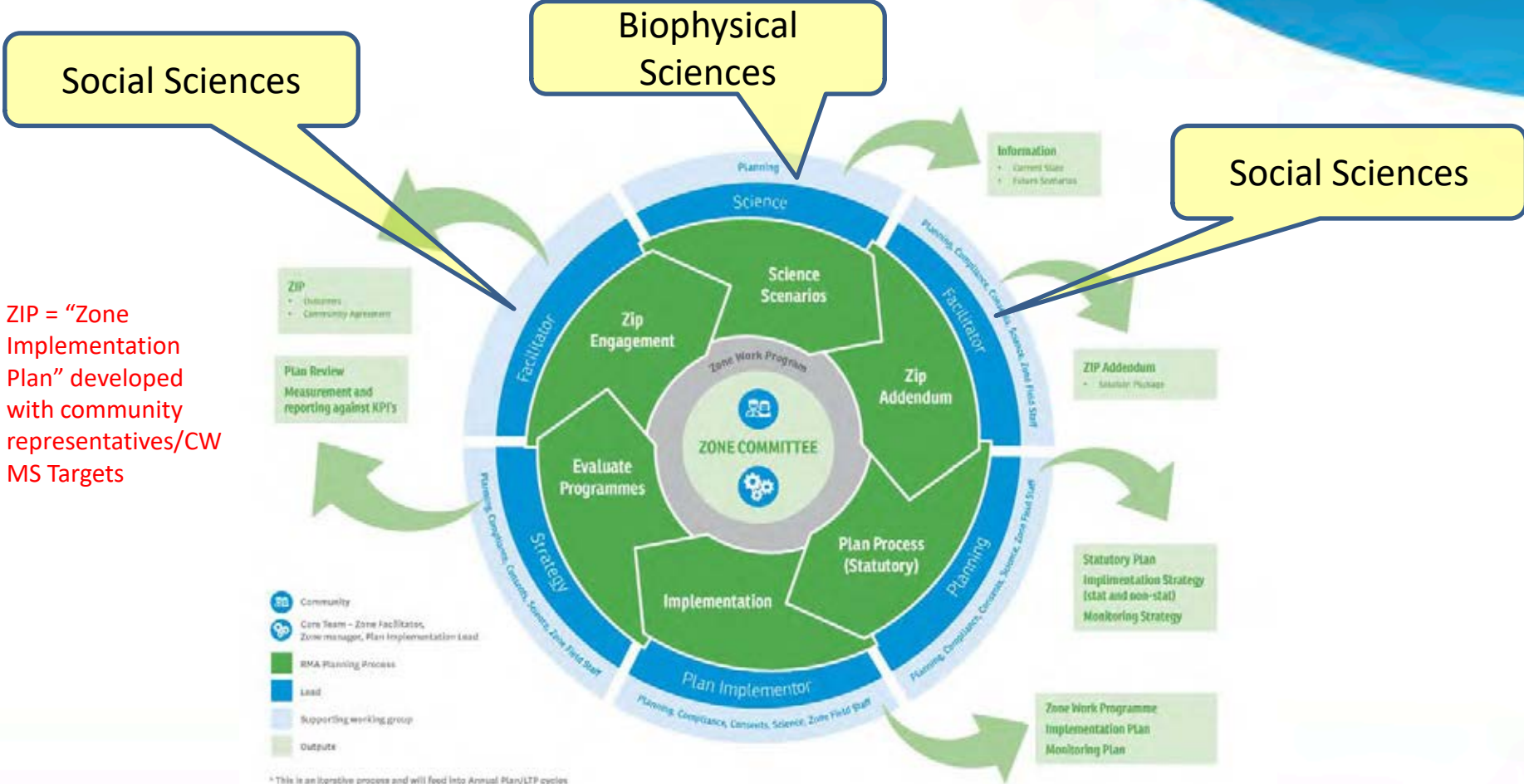
"One of the good things to happen is the Oefrag group has worked out how to work together," says Isbister. "Irrigators have got to fit into where the community want us to be and I don't think that's unreasonable.

"We're fortunate we've got a lake. It's had a couple of challenging years but I think there's been some good outcomes. With Oefrag we're all in the room sitting round a table saying, 'This is what's in front of us, what are we going to do?'"

As well as supplying water for irrigation, there has to be enough water to keep the Opuha and Opihi Rivers flowing and the community group has worked together to ensure this.

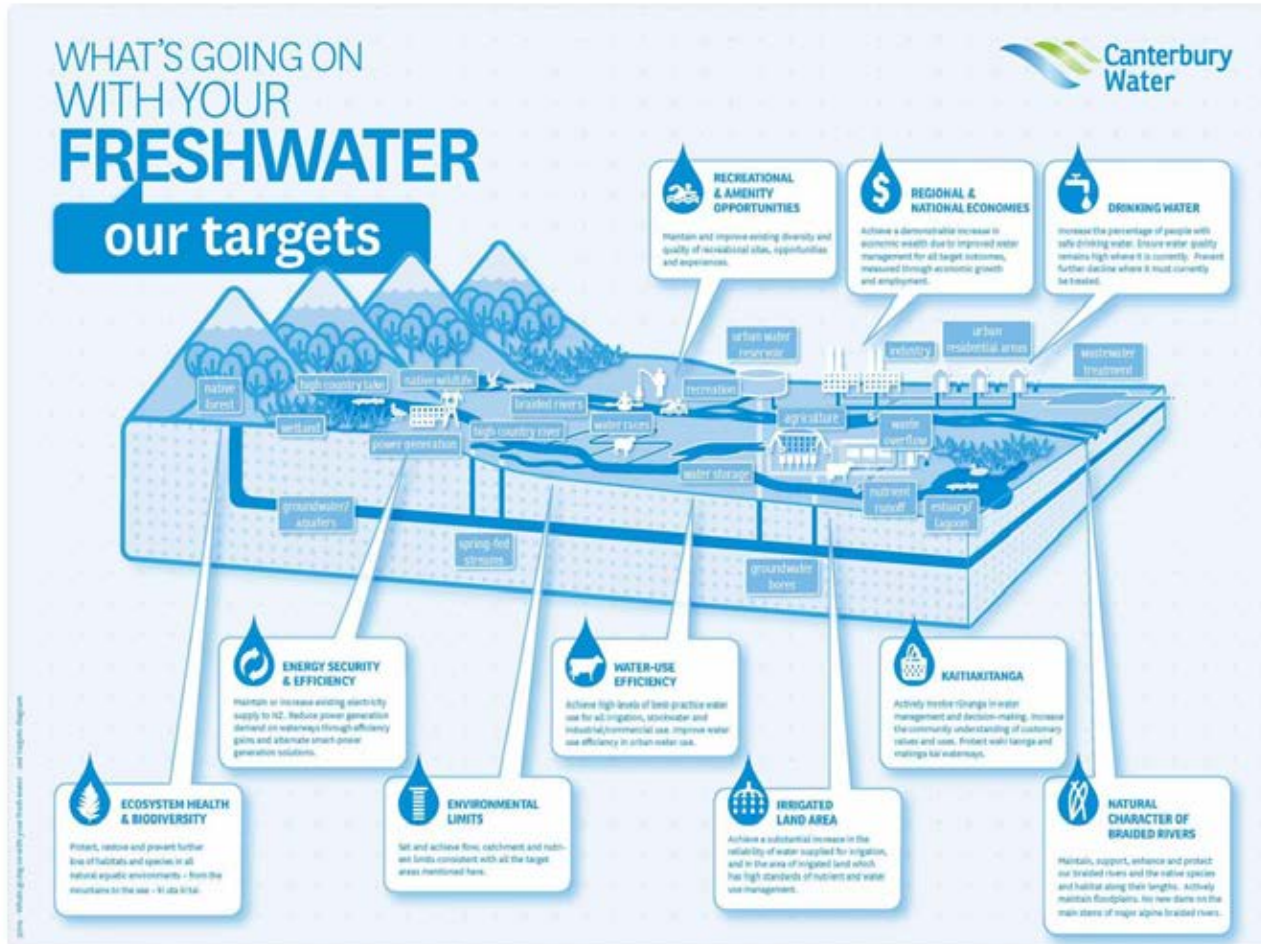
"The community has decided what's right for the community and that's been really good and Environment Canterbury has been allowing us some flexibility around that which I think, if you look at river management in the future, is a blueprint for how we should be trying to get our river management."

Mobilisation of Science



ZIP = “Zone Implementation Plan” developed with community representatives/CW MS Targets

Outcomes – Targets



Infrastructure supporting outcomes

- Start of process (2010) – assumption was that major new headworks (especially big, expensive dams) required
- By 2016 we are seeing:
 - Better use of existing infrastructure
 - Investments in demand reduction and better distribution of water (A recent driver of change is the need to minimise Nitrate runoff) – another “crisis”.
 - Innovative ideas from community and industry (farmers, irrigation companies, service providers) to meet economic and environmental targets.
- More robust business case development that incorporates the results of the IWRM/CWMS process

Participation of indigenous people

- CWMS process has benefited from previously marginalised perspectives
- Indigenous perspective (holistic approach) matches equivalent concepts emerging from recent Treasury work
- Local Māori Iwi (Ngāi Tahu) have evolving partnerships with key local government organisations and participate in representative committees
- Increasing examples of alignment of indigenous peoples and other perspectives

Lessons

- IHP has a focus (IWRM/Ecohydrology) relevant to NZ
- IWRM and Ecohydrology (etc.) have been deployed on a large scale in Canterbury
- A “crisis” can be an opportunity to apply Sciences that deliver solutions: But Sciences benefit from being “self-organised” (e.g. via IHP) if there has been complacent governance
- Engage with policy agencies and business! Better mobilisation of Science (Social and Biophysical) alongside multiple cultural perspectives creates better results for everyone – including investors and Government Policy Agencies/Treasury.
- Work with people! Providing insights in a context that helps modify behaviour is a critical part of Science being valued.
- There are real benefits to incorporating previously marginalised perspectives. Māori/ Ngāi Tahu perspective a source of competitive advantage for NZ/Canterbury.
- The IWRM/CWMS process looks expensive and time consuming – until compared to one “mistake” in water infrastructure investment using methods that should have been discarded years ago.....

Finally, you can't please everyone...

Letters

Will anything change?

When I gazed at your Environment Canterbury front page (Oct 19), all I saw was a bunch of shiny-backed suits and expensive hair-dos.

Not the sort of crowd I would expect to be capable of tackling the critical condition in which we now find our once pristine aquifers and snow-fed rivers.

Furthermore, having recently attended a public meeting put on by the said institution's experts and "boffins", I was subjected to a couple of hours of inaudible, poorly presented, claptrap.

If this was supposed to fill us with admiration for their pathetic efforts to address the critical water problems it failed dismally.

Ngai Tahu's attempt to demonstrate "culturally sensitive" areas was also a dismal failure.

I suggest before any further attempts are made all these people take a crash course in public speaking.

Graham Johnson
Kalapoi

"I was subjected to a couple of hours of inaudible, poorly presented, claptrap."

Graham Johnson



Environment Canterbury's new council, from back left: David Bedford, Iaeen Cranwell, John Sunckell, Rod Cullinane, David Caygill, Peter Skelton and Steve Lowndes. Front row, Claire McKay, Elizabeth Cunningham, Tom Lambie, Lan Pham, Peter Scott and Cynthia Roberts.

A new opportunity for extreme hydrologic prediction research using the **d**atabase for **P**olicy **D**ecision making for **F**uture climate change (d4PDF)



Yasuto TACHIKAWA

Hydrology and Water Resources Research Lab.
Dept. of Civil & Earth Resources Engineering, Kyoto University

database for Policy Decision making for Future climate change (d4PDF)

MRI-AGCM 3.2H, 60km spatial resolution

■ Present Climate Experiments:

100 sets of 60 years climate simulation under different boundary conditions, which provides **6,000 years** hydrologic time series data

■ The End of 21st Century Climate Experiments:

90 sets of 60 years climate simulation under different initial and boundary conditions, which provides **5,400 years** hydrologic time series data

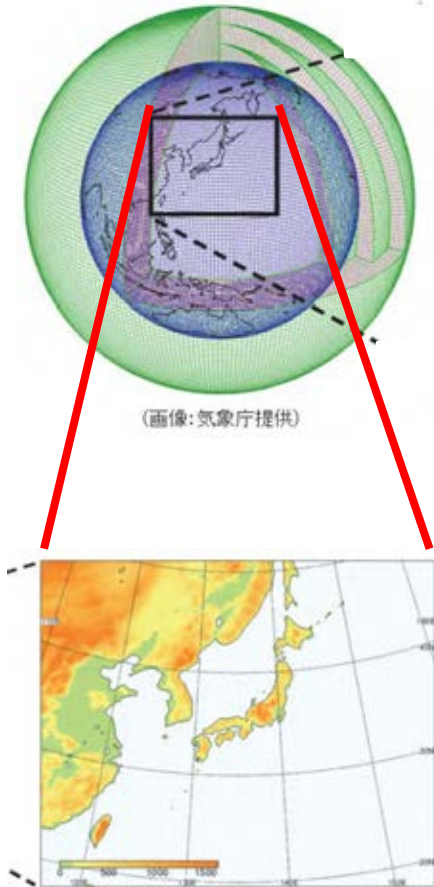
MRI-NHRCM, 20km spatial resolution

■ Present Climate Experiments:

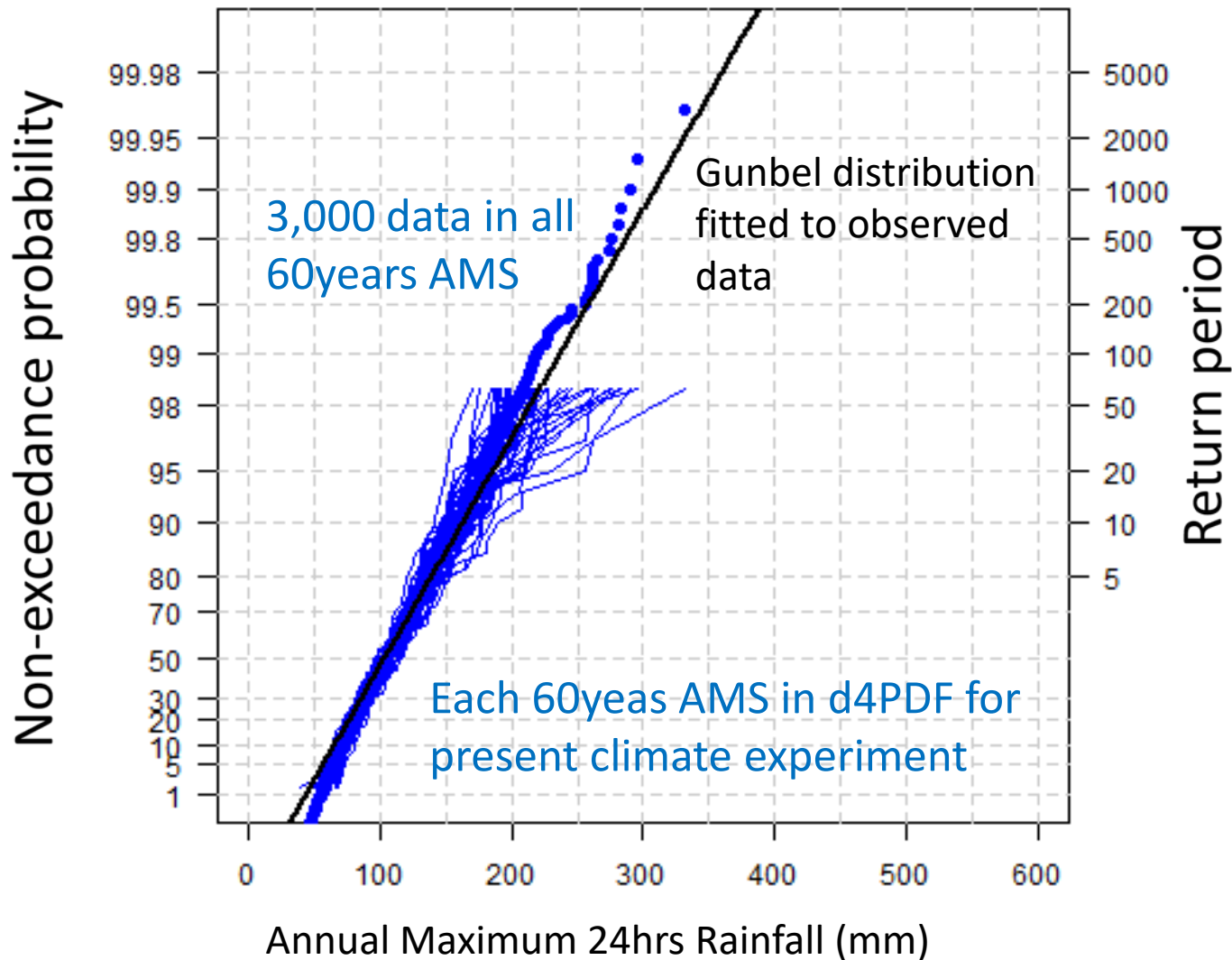
50 sets of 60 years climate simulation under different boundary conditions, which provides **3,000 years** hydrologic time series data

■ The End of 21st Century Climate Experiments:

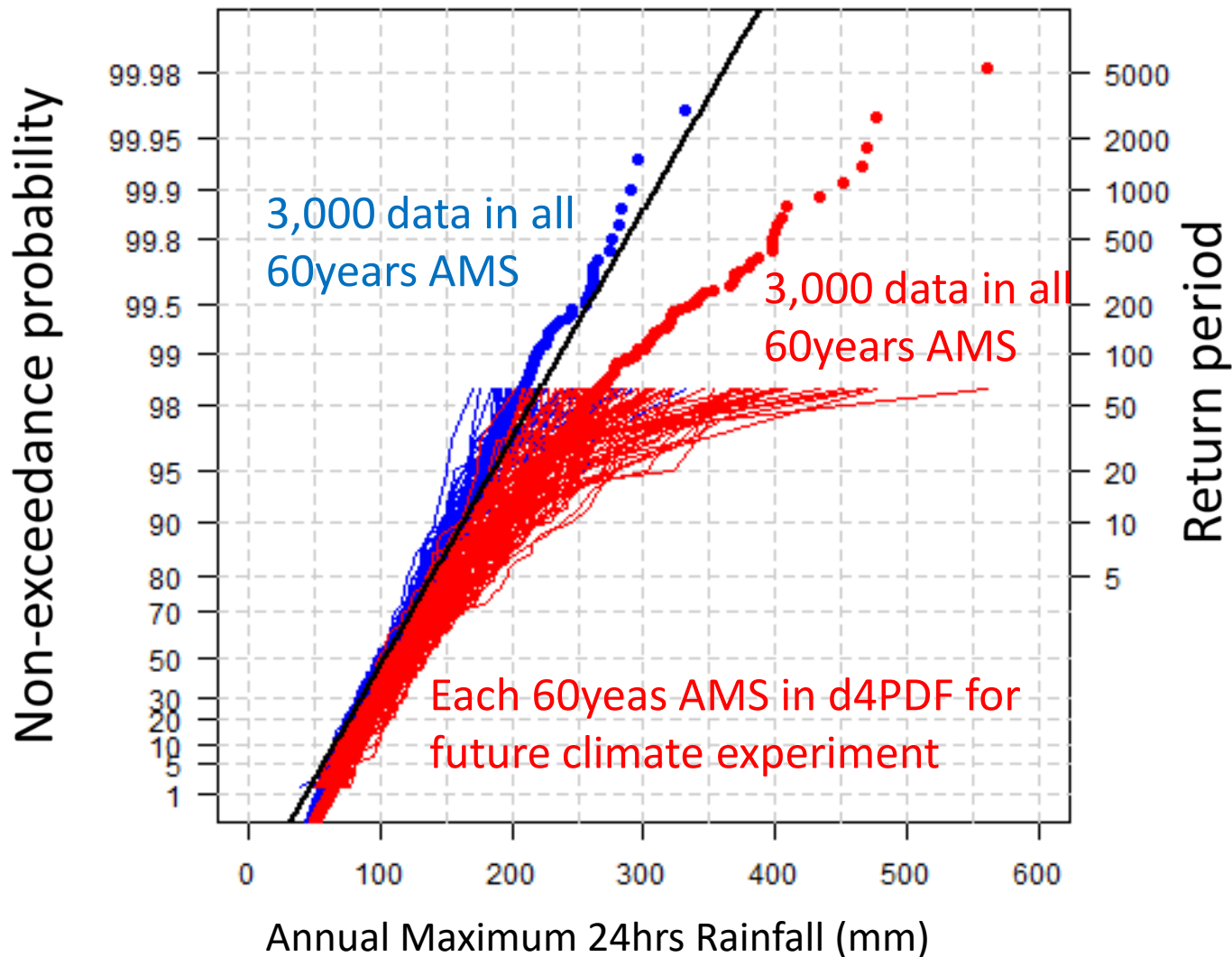
90 sets of 60 years climate simulation under different initial and boundary conditions, which provides **5,400 years** hydrologic time series data



Probability Plot for Annual Maximum 24hrs Catchment Mean Rainfall at Yodo River Basin

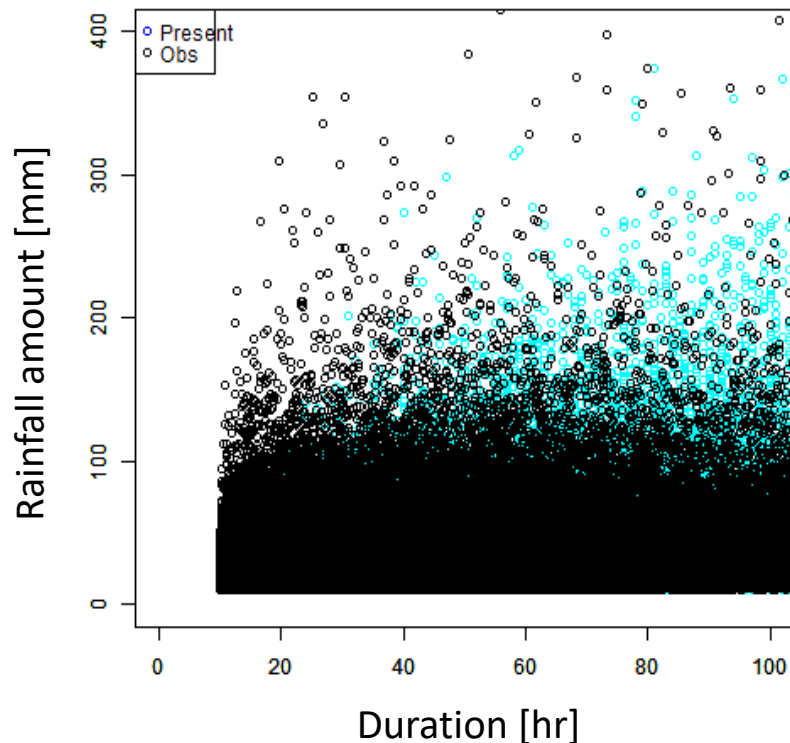


Probability Plot for Annual Maximum 24hrs Catchment Mean Rainfall at Yodo River Basin



Comparison of catchment mean rainfall in terms of duration and total amount

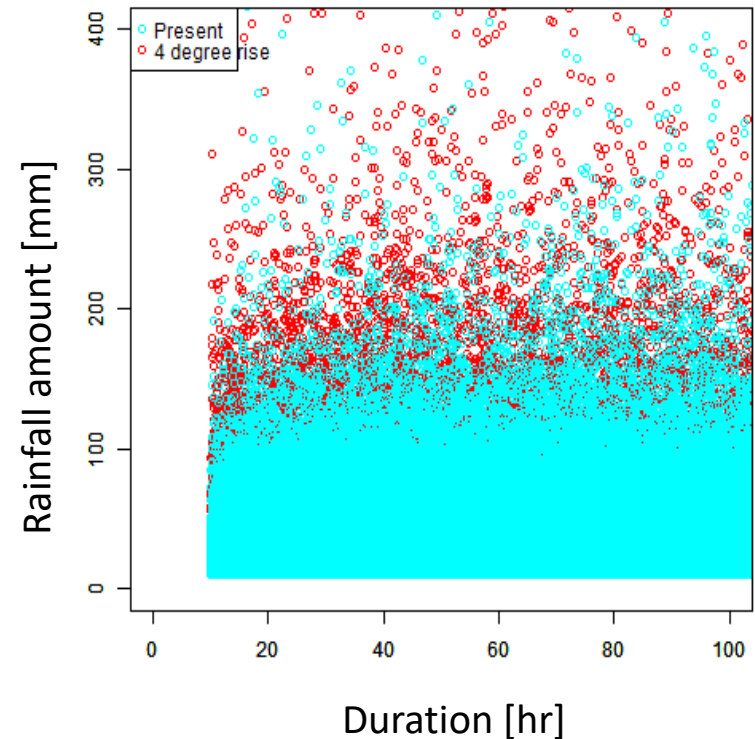
Black: Observed, Blue d4PDF(present)



Rate of occurrence of rainfall events more than 150mm

Observed: 0.51%, d4PDF(present): 0.61%

Red: d4PDF(future), Blue d4PDF(present)



Rate of occurrence of rainfall events more than 150mm

d4PDF: 0.61%, d4PDF(present): 1.1%

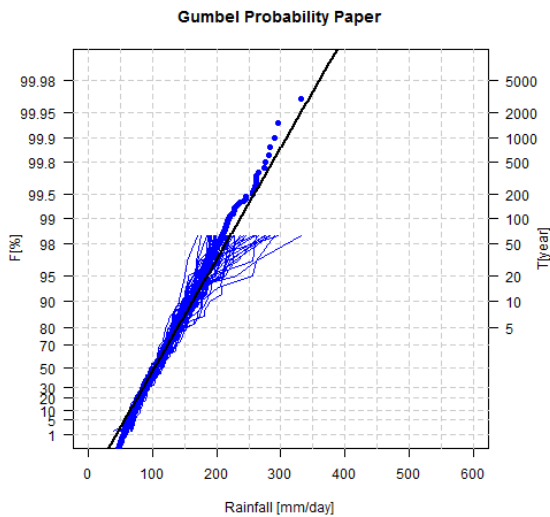
Summary

- An extreme frequency distribution estimated by d4PDF was well matched to observed one.
- d4PDF provides very long hydrologic time series data (future projections: 5,400 years).
- d4PDF offers a new opportunity for extreme hydrologic prediction research.



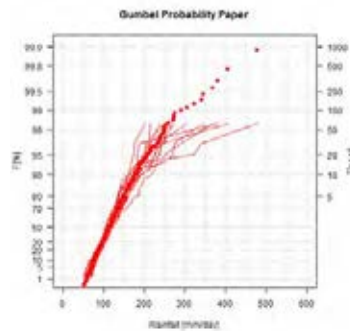
Difference of future annual maximum 24hrs catchment mean rainfall at Yodo River basin due to different SST settings

Present climate
RCM 50members

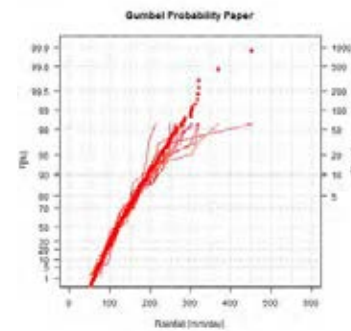


Future climate experiment
15 members for each SST setting

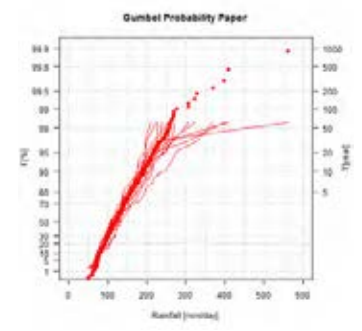
CCSM4 (CC)



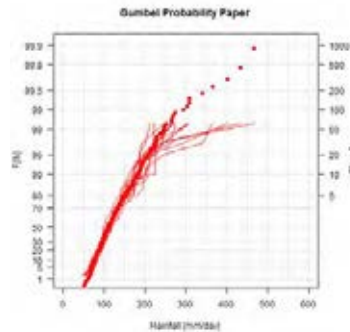
GFDL-CM3 (GF)



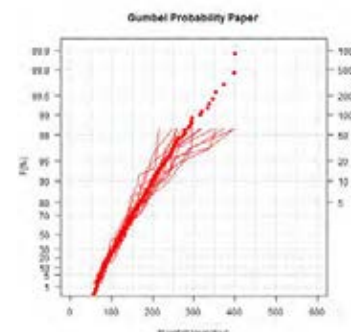
HadGEM2-AO (HA)



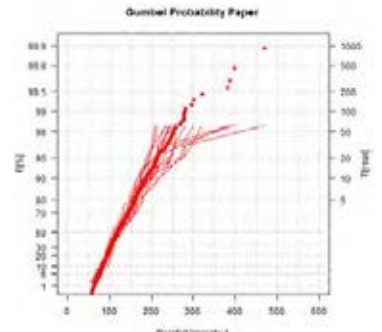
MIROC5 (MI)



MPI-ESM-MR (MP)



MRI-CGCM3 (MR)



Water Security in Arid Environment

Thoughts from the
Global Runoff Data Centre (GRDC)
and the
UNESCO Cat 2 International Centre for
Water Resources and Global Change

24th IHP-Regional Steering Committee Meeting
in conjunction with the
International and national water dialogue on the delivery of SDG 6 in
Mongolia and wider Asia and the Pacific region
24 – 26 October 2016
Ulaanbaatar, Mongolia

Ulrich Looser (looser@bafg.de)

You Can't Manage What You Don't Measure

Water Quantity -

and

Water Quality-monitoring

are key aspects
to escort and monitor
SDG 6 objectives



Data sharing with international centres such
as **GRDC** and **GEMStat** are vital for success

GRDC offers collaboration with UNCCD

African Drought Conference (Windhoek Declaration, August 2016) adopts Strategic Framework for Drought Risk Management and Enhancing Resilience guided by the following six principles:

1. Drought policy and governance for drought risk management
2. Drought monitoring and early warning
3. Drought vulnerability and impact assessment
4. Drought mitigation, preparedness and response
5. Knowledge management and drought awareness
6. Reducing underlying factors of drought risk



Cat 2 Centre active in Arid Regions



International Centre for Water Resources and Global Change

has strong interest in Arid Regions with project proposals for FAO Green Climate Fund on:

- Water efficiency
- Water Pricing

FAO Green Climate Fund promotes the paradigm shift towards low-emission and climate-resilient development pathways





Cat 2 Centre active in Arid Regions



International Centre for Water Resources and Global Change

Linked to: “Coping with Water Scarcity in
Agriculture” FAO input to UNFCCC-COP 22 in
Marrakesh, November 2016

Contributes to: The Global Forum for Food and
Agriculture “Agriculture and Water – Key to
Feeding the World” in January 2017 in Berlin



- Scientific collaboration on joint proposals dealing with
 - “Water Scarcity and Water Security ”
 - Product development based on in situ measurements, remote sensing and models
 - Links between water availability and water quality
- Water quantity and quality data exchange
- Capacity development:
 - PhD student exchanges and co-supervision,
 - study tours,
 - organisation of joint events



Global Runoff Data Centre Koblenz, Germany

...more than 27 Years GRDC



Thank you for your attention!

Please visit GRDC at
<http://grdc.bafg.de>

The GRDC at your service:

grdc@bafg.de

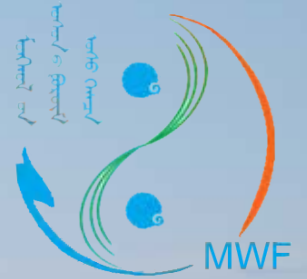
Tel: +49-261-1306-5224
Fax: +49-261-1306-5722

Am Mainzer Tor 1
D-56068 Koblenz



(Water Supply and Sewerage Authority Ulaanbaatar City)

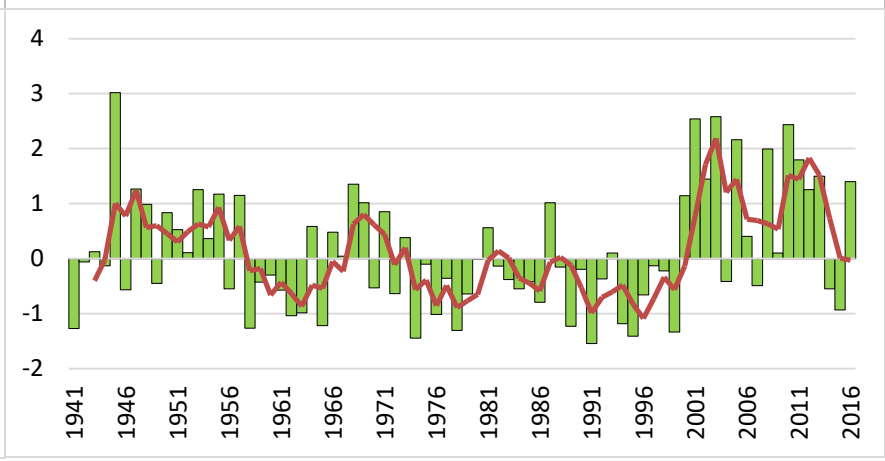
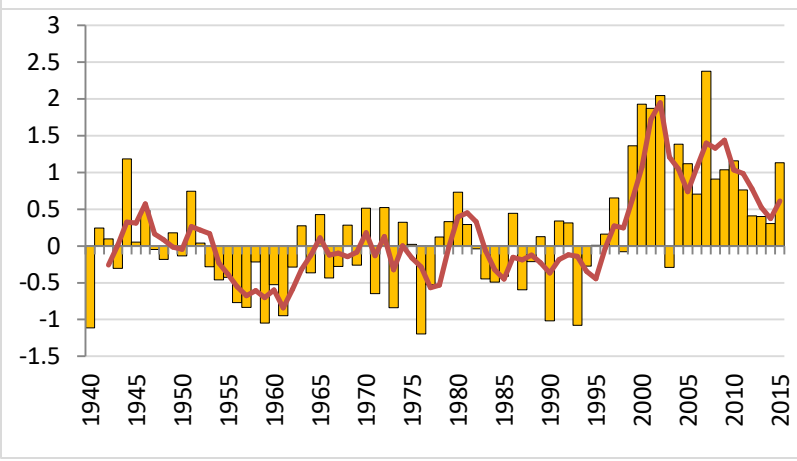
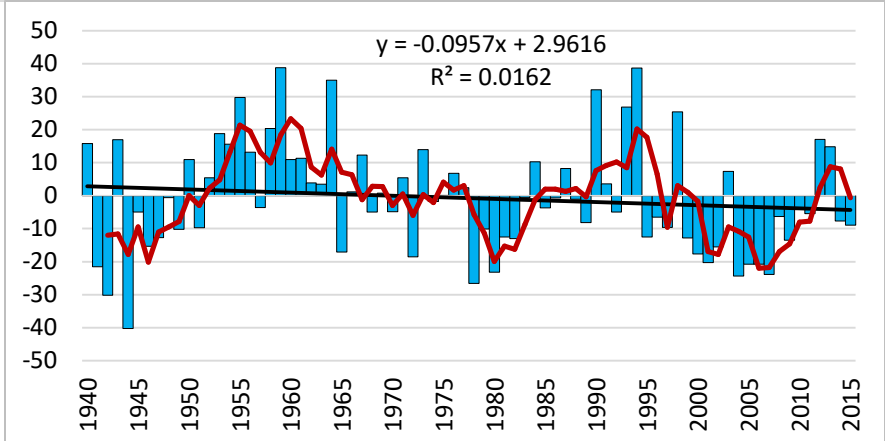
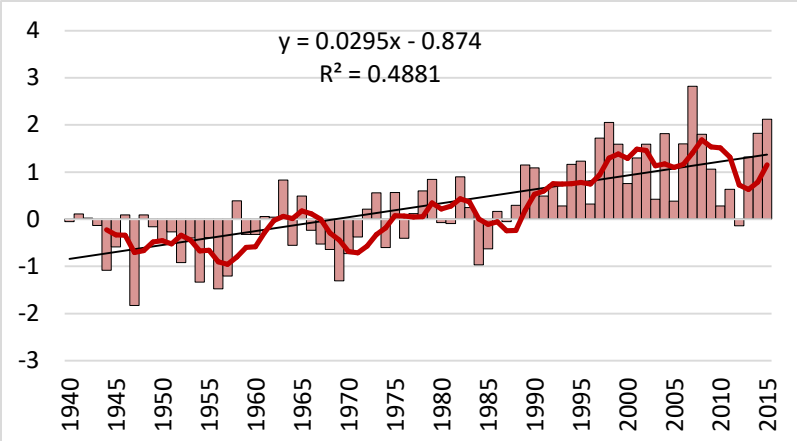




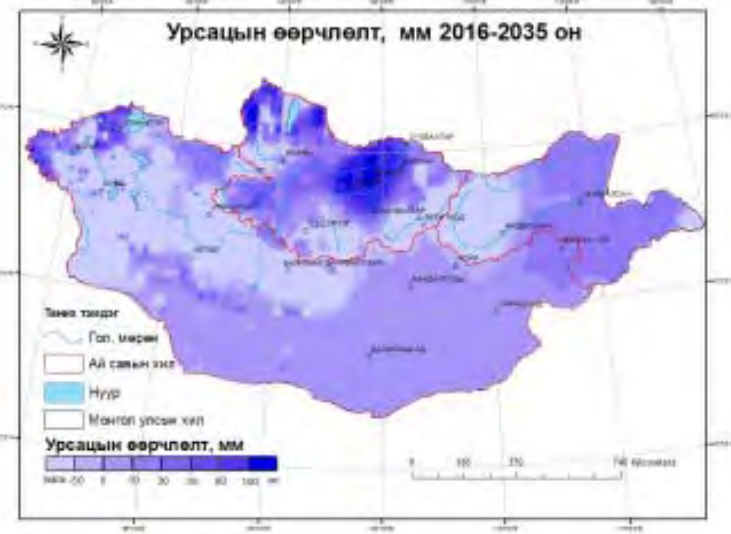
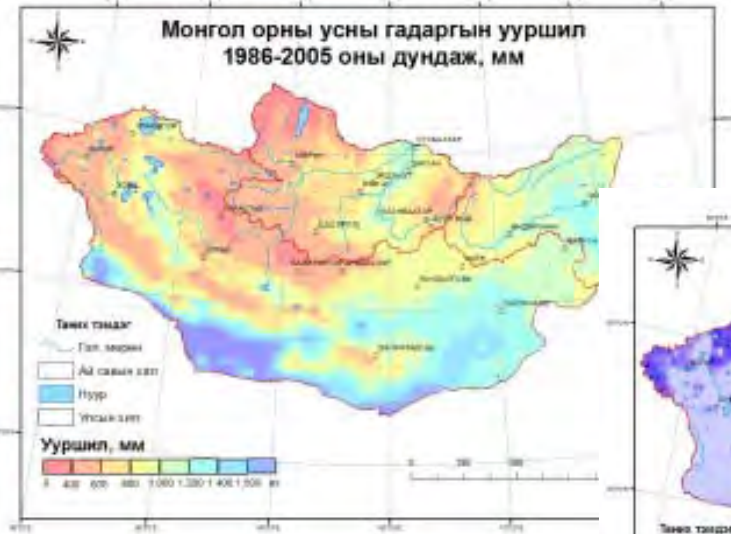
COUNTRY WATER SECURITY

Climate change

بصفتھ صر امرتھ و قھتھ صر سوہتھ



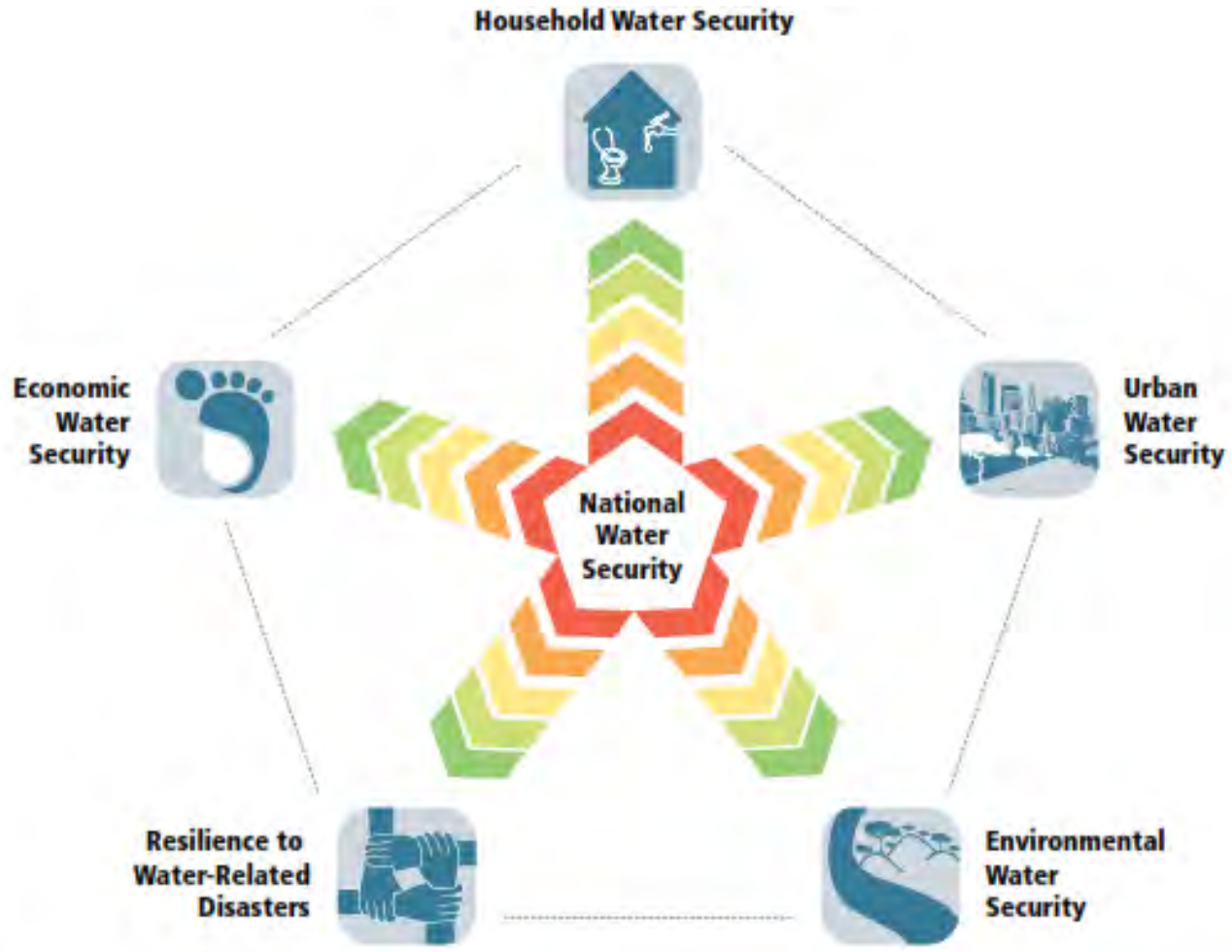
Water resources changes



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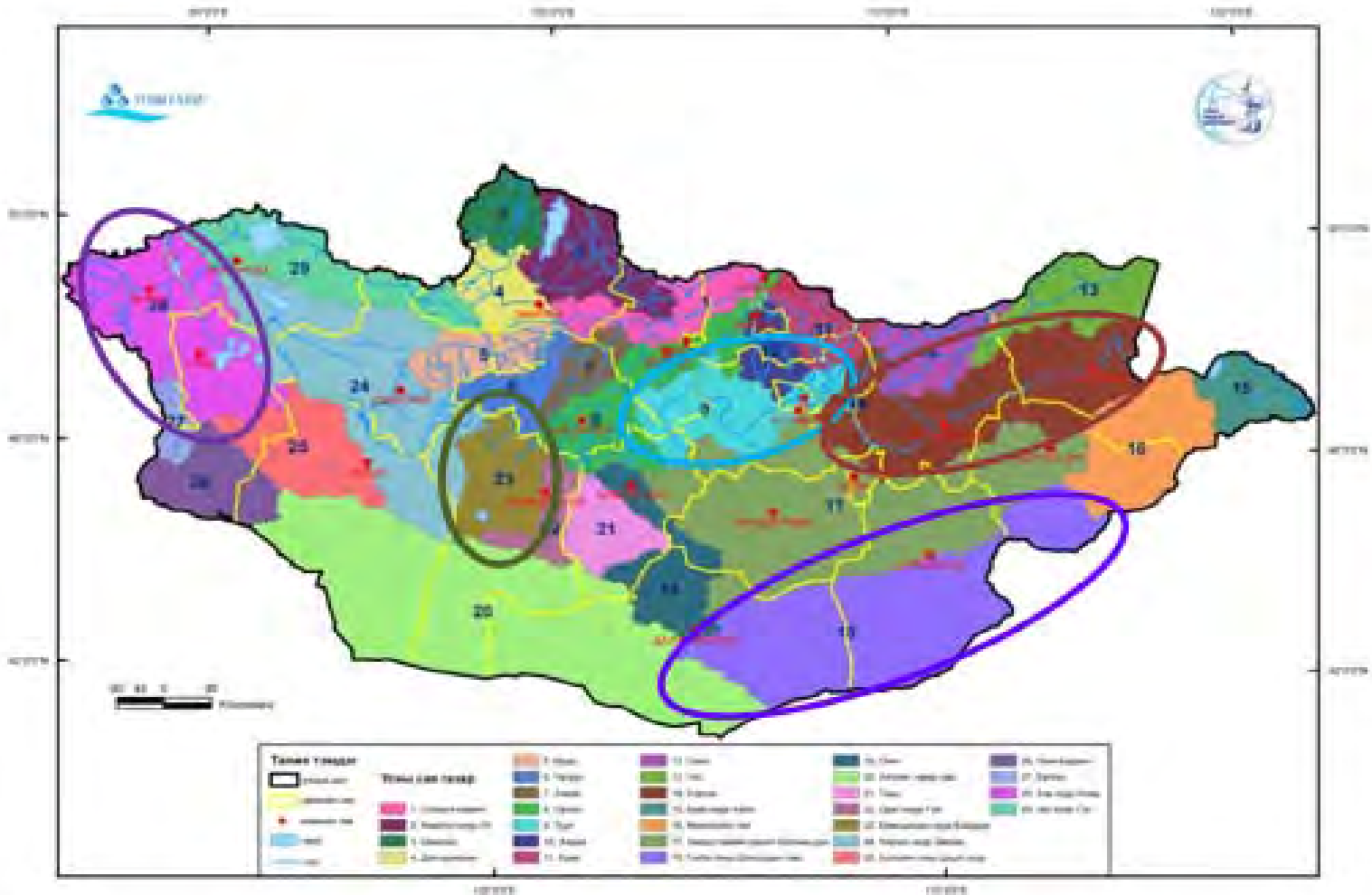
Water security

Угсаа бичээчдийн эдийн засгийн, орлогын, амьжиргаа, эрүүл мэндийн хэрэгсэл



River basins

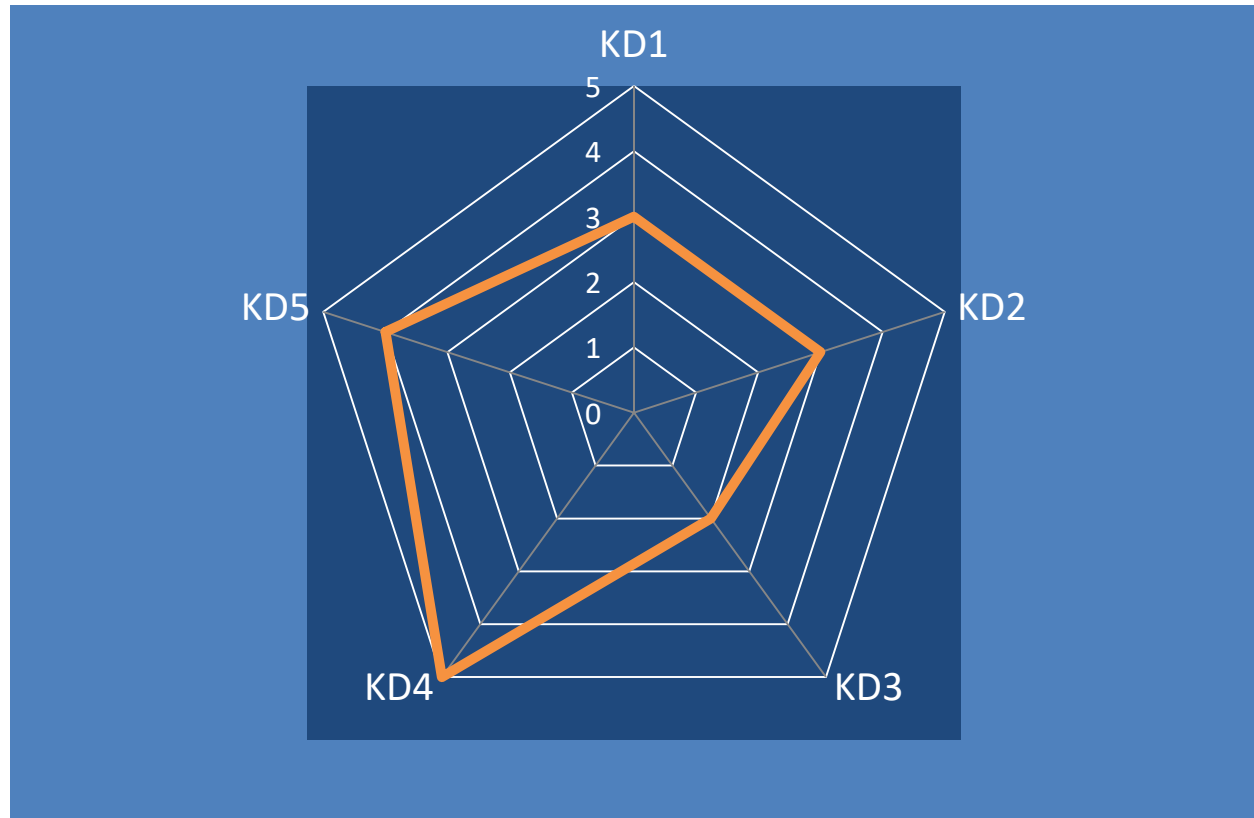
Бусны бүсүүд, усны хэрэгсэл, усны систем





Country water security

МОНГОЛЫН УСНЫ ФОРУМ



Thank you

Geopark as a Model for Environmental Sustainability

Ibrahim Komoo

Vice Chair, UNESCO Global Geoparks Council

Vice President, Global Geoparks Network Association

Coordinator, Asia Pacific Geoparks Network

Advisor, Langkawi UNESCO Global Geopark

Principal Fellow, LESTARI-UKM



Flow of Presentation

- What is UNESCO Global Geoparks?
- Characteristic of UNESCO Global Geopark
- Key Milestone of UNESCO Global Geoparks
- Distribution of UNESCO Global Geoparks
- Framework for Geopark Development
- Model for Environmental Sustainability
- Concluding Remarks



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Okii UNESCO Global Geopark, Japan

What is UNESCO Global Geopark?

Single and unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education and sustainable development.



Unzen UNESCO Global Geopark, Japan

Characteristics of UNESCO Global Geoparks

- Uses its geological heritage, in connection with all other aspects of the area's natural and cultural heritage, to enhance awareness and understanding of key issues facing society.
- Give local people a sense of pride in their region and strengthen their identification with the area.
- Creation of innovative local enterprise, new jobs and skills to stimulate new sources of revenue through geotourism.



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Lushan UNESCO Global Geopark, China

Key Milestone of UNESCO Global Geoparks

- 1997: UNECO General Conference approved an initiative to promote a global network of geosites (promotion of geoheritage conservation globally).
- 2000: UNESCO Executive Board deliberated proposal on 'UNESCO Geoparks Program' and agree to support and effort by member states to establish their national geoparks.
- 2000: the European Geoparks Network (EGN) was established by four geopark territories, in France, Germany, Spain and Greece.



Idrija UNESCO Global Geopark, Slovenia

Key Milestone of UNESCO Global Geoparks

- 2004: UNESCO Advisory Committee on Geoparks established Global Network of National Geoparks (or Global Geoparks Network- GGN) with 25 geoparks from Europe and China As members.
- 2007: the 1st Regional Symposium on Asia Pacific Geoparks held in Langkawi Global Geopark established Asia Pacific Geoparks Network (APGN).
- 2013: the Association for Global Geoparks Network (GGN) as a legal entity was established to replace an Advisory Committee's GGN Bureau.



Key Milestone of UNESCO Global Geoparks

- 2015: UNESCO General Conference approved the UNESCO Global Geoparks under International Geosciences and Geoparks Program (IGGP)



Aso UNESCO Global Geopark, Japan



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Distribution of UNESCO Global Geoparks



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Framework for Geopark Development

HERITAGE CONSERVATION

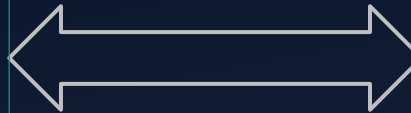
- Conservation of geological, biological and cultural heritage
- Integrated conservation of natural and cultural heritage
- Sustainable utilisation of heritage resources without destruction

ECONOMIC DEVELOPMENT

- Balancing mass and specialised tourism
- Geotourism as a part of knowledge-based tourisms
- Innovative tourism products

COMMUNITY DEVELOPMENT

- Community as a key player
- Capacity building of local community
- Education on heritage
- Strengthening of 'shared values'





Kula UNESCO Global Geopark, Turkey

Model for Environmental Sustainability

- Heritage Conservation
 - Conservation/ protection of geological heritage (geosite).
 - Adopt and enhance existing biological and cultural heritage conservation.
 - Encourage an integrated nature and cultural heritage conservation.
 - Develop interpretation based on 'Earth Story' (linked between geology, biology and human history and civilisation).



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of Malaysia





Karawanks UNESCO Global Geopark, Austria-Slovenia

Model for Environmental Sustainability

- Sustainable Economic Development
 - to balance between mass and specialized tourism.
 - introduce geotourism – new knowledge-based sustainable tourism.
 - no selling of ‘geoheritage products’.
 - use ‘geotrail’ to manage unsustainable tourism activities.
 - education on natural history, hazards and environmental services.



Model for Environmental Sustainability

- Community Development
 - community as custodian of the geopark (empowerment).
 - capacity building for local community.
 - education for heritage conservation and environmental services.
 - enhance sense of places, shared value and pride.



Qeshm Global Geopark, Iran



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of Malaysia





Gea Norvegica UNESCO Global Geopark, Norway

Concluding Remarks

- Geopark is an innovative Sustainable Development Solution for a region, particularly with regards to environmental sustainability.
- Based on protection and conservation of geological heritage (largely ignored in nature conservation initiative).
- An integrated understanding of 'natural history' and its connectivity to human history and civilization.



MAB activities in Japan and collaboration between MAB and IHP

Japanese National Committee for
MAB

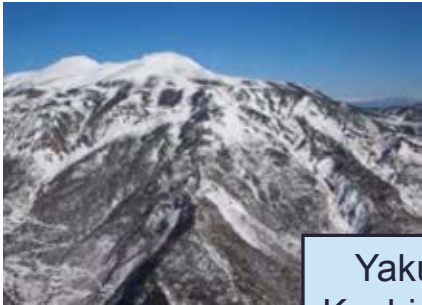
Man & the Biosphere Programme

Biosphere Reserves of MAB Programme

Total 7 areas in Japan

Mt. Hakusan
in 1980 and
2016

白山火山(©白山市)



Shiga
Highland in
1980, 2014



志賀高原(©山ノ内町)

Yakushima and
Kuchinoerabu Jima
in 1980 and 2016

縄文杉(©屋久島町)



Mt. Odaigahara, Mt.
Omine and Osugidani
in 1980 and 2016

Aya in 2012

照葉樹林(©綾町)



大杉谷峡谷シシ淵(©大台町)



Minami Alps in 2014

甲斐駒ヶ岳と水田(©南アルプス市)



Tadami in
2014



ブナ天然林(©只見町)

First Generation of BRs in Japan

In 1980, four BRs were approved by UNESCO

A map of Japan is shown with several Biosphere Reserves (BRs) highlighted in green. Lines connect these locations to text boxes providing their names and UNESCO approval years. The BRs and their approval years are: Mt. Hakusan (1980 and 2016), Shiga Highland (1980, 2014), Yakushima and Kuchinoerabu Jima (1980 and 2016), Mt. Odaigahara, Mt. Omine and Osugidani (1980 and 2016), Minami Alps (2014), Tadami (2014), and Aya (2012). The map also includes red triangles indicating other locations like Aya, Mt. Odaigahara, Mt. Omine, and Osugidani.

Mt. Hakusan in 1980 and 2016
白山火山 (©白山市)

Shiga Highland in 1980, 2014
志賀高原 (©山ノ内町)

Yakushima and Kuchinoerabu Jima in 1980 and 2016
縄文杉 (©屋久島町)

Mt. Odaigahara, Mt. Omine and Osugidani in 1980 and 2016
照葉樹林 (©綾町)
大杉谷峡谷シシ淵 (©大台町)

Minami Alps in 2014
甲斐駒ヶ岳と水田 (©南アルプス市)

Tadami in 2014

Aya in 2012

Platanus Natural Forest (©只見町)
ブナ天然林 (©只見町)

Second Generation of BRs in Japan

In 2012 and 2014, three BRs were approved by UNESCO, and first generation BRs were approved their extensions in 2014 and 2016.

The map shows the following Biosphere Reserves and their UNESCO approval years:

- Mt. Hakusan** in 1980 and 2016
- Shiga Highland** in 1980, 2014
- Yakushima and Kuchinoerabu Jima** in 1980 and 2016
- Mt. Odaigahara, Mt. Omine and Osugidani** in 1980 and 2016
- Minami Alps** in 2014
- Tadami** in 2014
- Aya** in 2012

Additional locations shown on the map include:

- 白山火山 (©白山市)
- 志賀高原 (©山ノ内町)
- 縄文杉 (©屋久島町)
- 照葉樹林 (©綾町)
- 大杉谷峡谷シシ淵 (©大台町)
- 甲斐駒ヶ岳と水田 (©南アルプス市)
- ブナ天然林 (©只見町)

Accompanying photographs show: Mt. Hakusan, Shiga Highland, Yakushima, Aya, Mt. Odaigahara/Mt. Omine/Osugidani, Minami Alps, Tadami, and Bunko Natural Forest.

Characteristics of Japanese BRs

Activities for sustainable development utilize the ecosystem with abundant nature in the country of local areas.

Japanese BRs are basically managed by local governments in close cooperation with local communities.

Activities of JBRN

- ◆ Seven BRs in Japan will formally establish the Japanese Biosphere Reserves Network (JBRN) to share experience and knowledge between existing BRs and enhance their activities.
- ◆ It is expected that JBRN will develop a platform for exchanging knowledge and ideas between BRs.

Standard Framework for BR Management in Japan

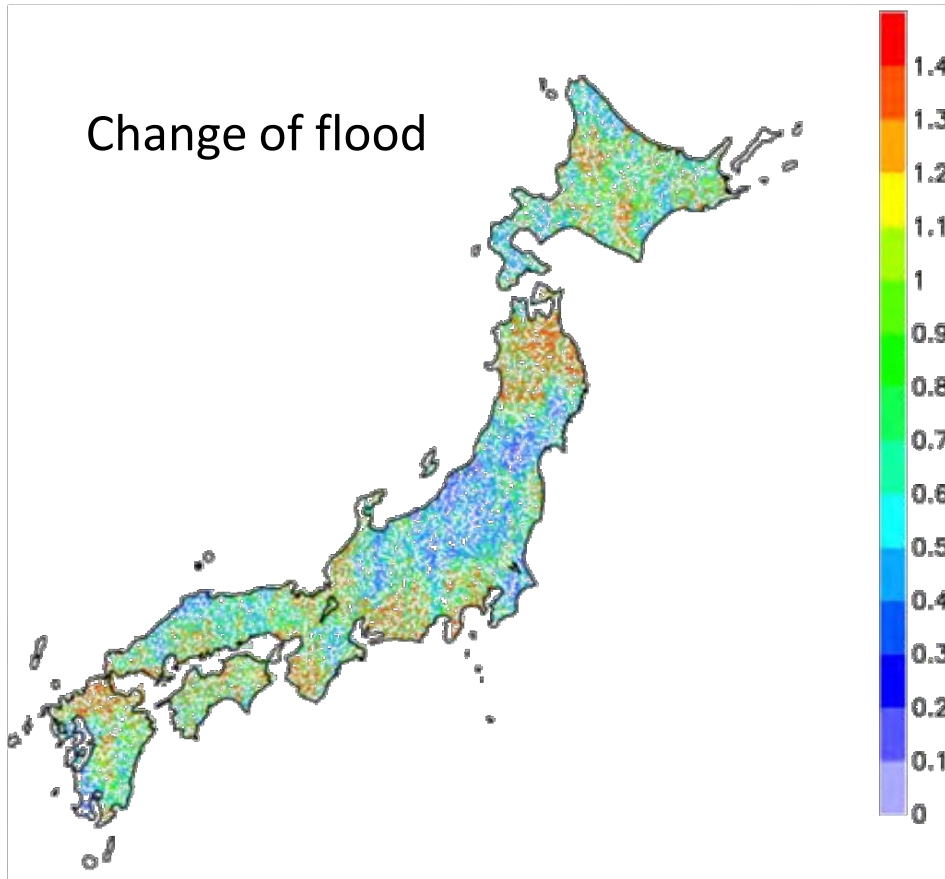
- ◆ The National Committee has established a standard for zonation of BRs. In this standard, laws and regulations suitable for core areas and buffer zones are demonstrated.
- ◆ This standard is not binding. Zonation should be made appropriately based on each situation.

Collaboration between MAB and IHP

- ◆ Hydrologic cycle
- ◆ Water resources
- ◆ IWRM
- ◆ Ecohydrology
- ◆ Climate change

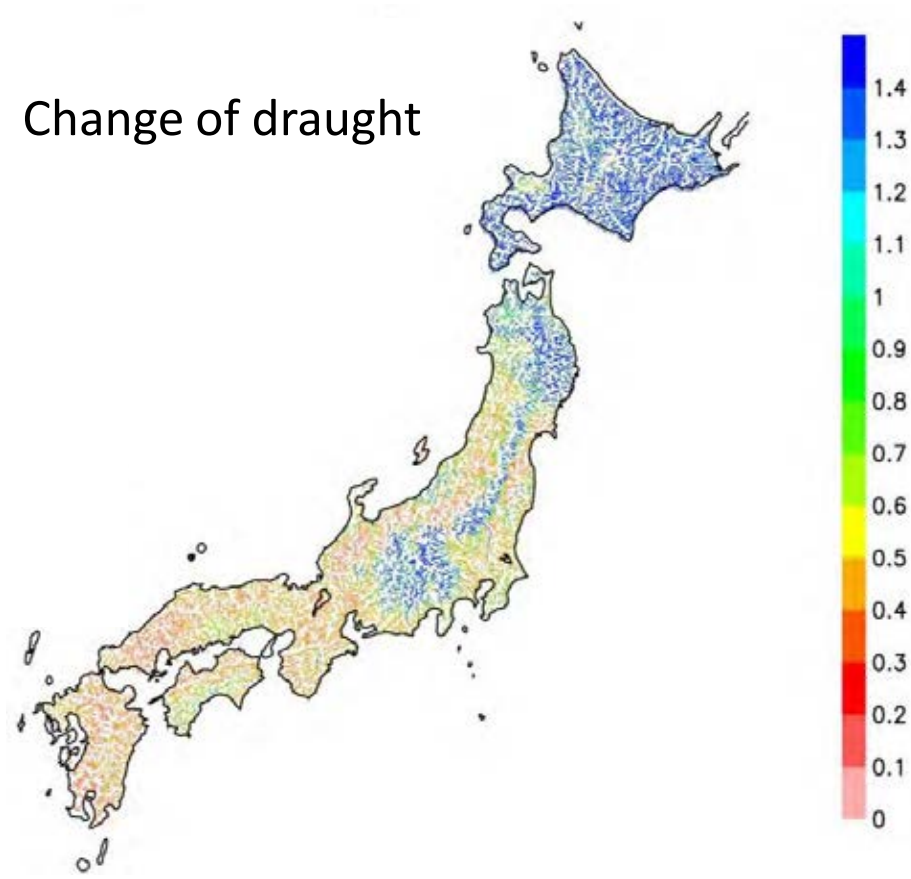
Change ratio of future river discharge under a climate change scenario

Change of flood



Change ratio of 100-year annual maximum hourly river discharge

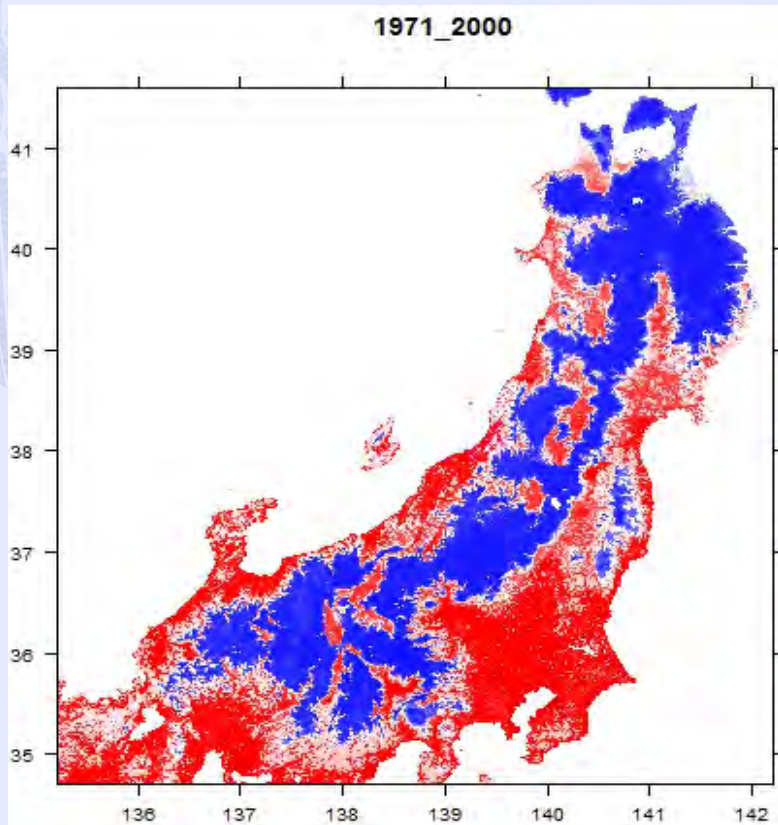
Change of draught



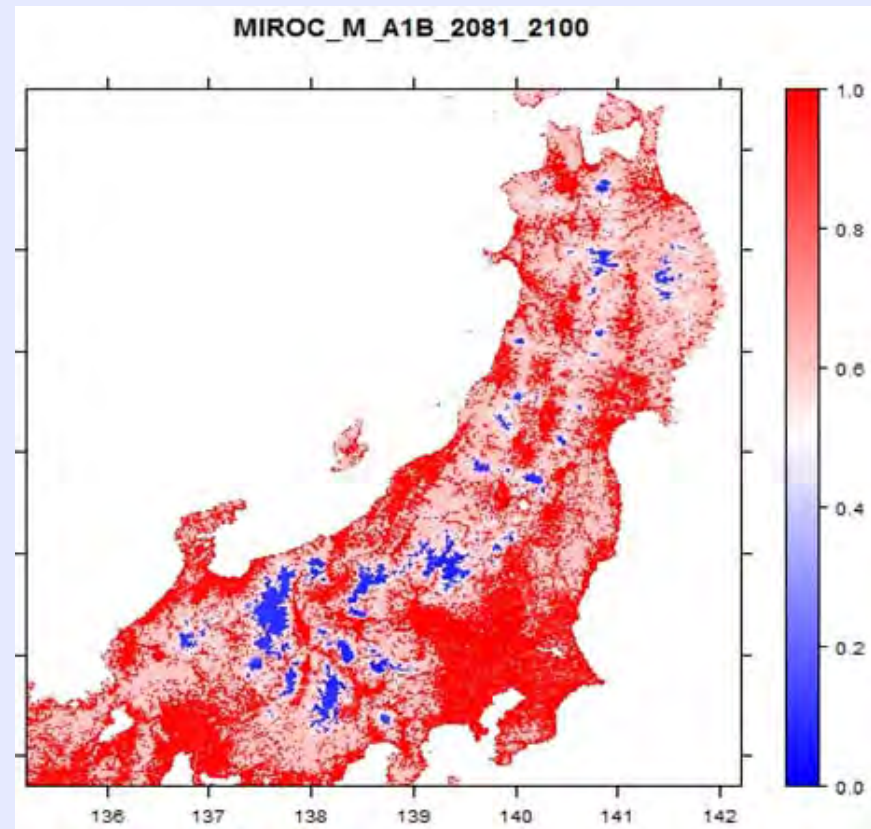
Change ratio of 10-year annual 10th smallest daily river discharge

Expansion of suitable habitats of bamboos (as shown in red) estimated by a species distribution model

Present climate 1971-2000



Future climate 2081-2100





**MINISTRY OF ENVIRONMENT
AND TOURISM**



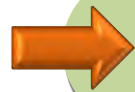
Biosphere Reserves of Mongolia



BATSANSAR Chilkhaajav

- **Director General, Department of Protected Areas Management**
- **Head of the National MAB Committee of Mongolia**

Brief introduction



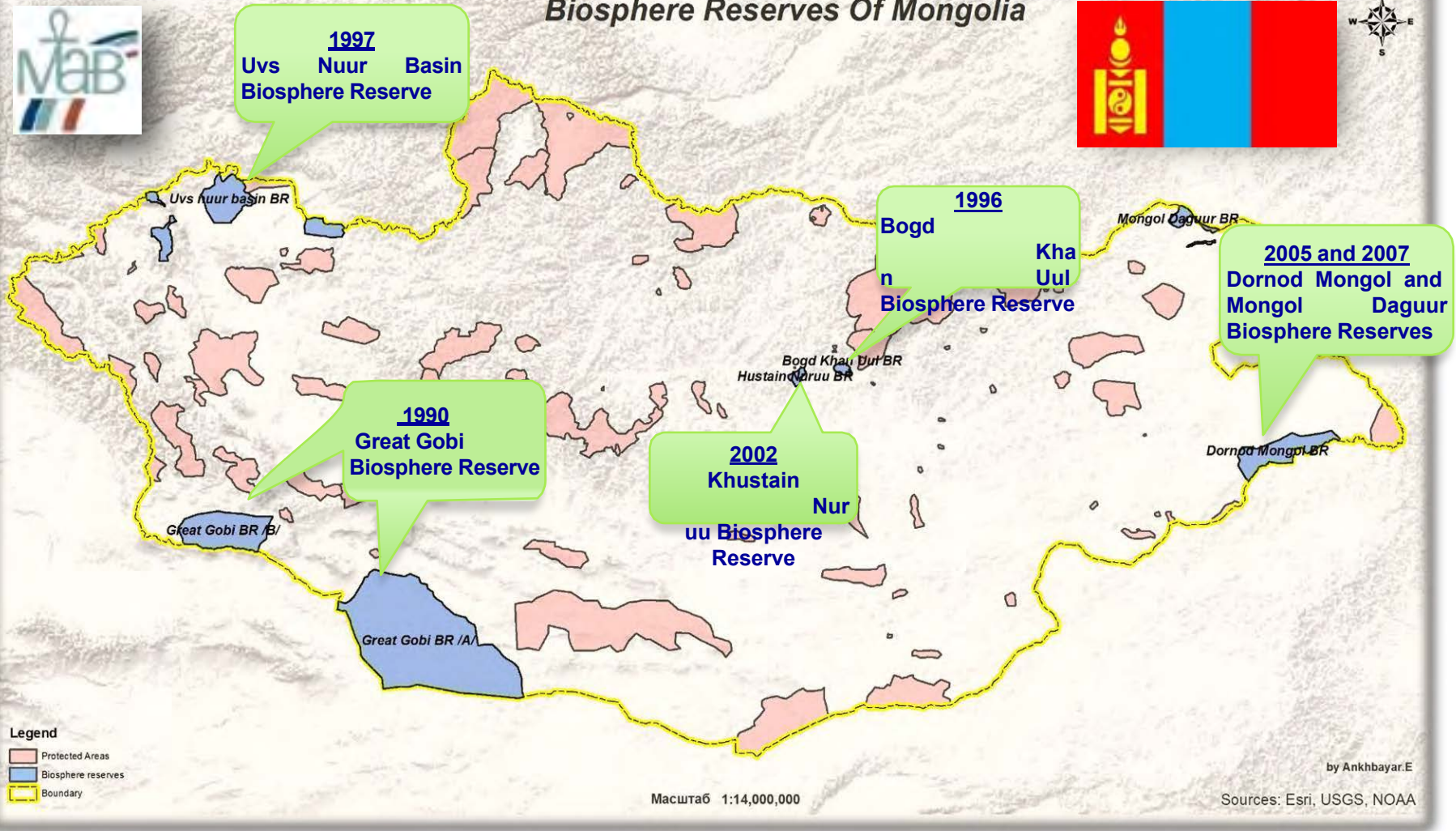
Mongolia has registered six territories in 11 locations to the MAB program which make up in total of 70961.6 sq.km.

No	Name of Biosphere Reserves	Area by ha	Year of designation
1	Great Gobi Biosphere Reserve	5,300,000	1990
2	Bogd Khan Uul Biosphere Reserve	67,300	1996
3	Uvs Nuur Basin Biosphere Reserve	771,700	1997
4	Hustai Nuruu Biosphere Reserve	394,537	2002
5	Dornod Mongol Biosphere Reserve	589,906	2005
6	Mongol Daguur Biosphere Reserve	732,000	2007



Locations

Biosphere Reserves Of Mongolia

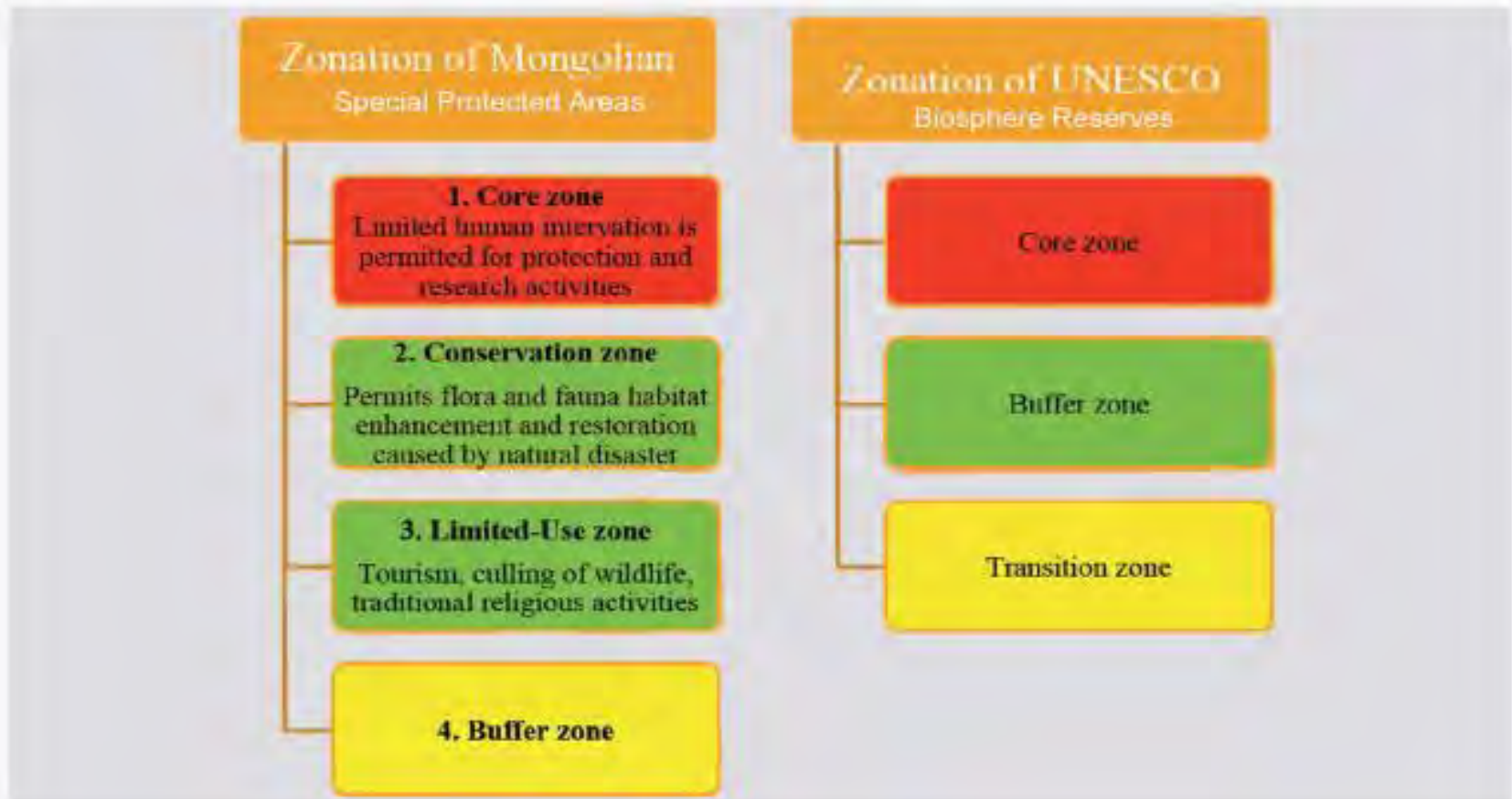




Zonation Map of BR's of Mongolia

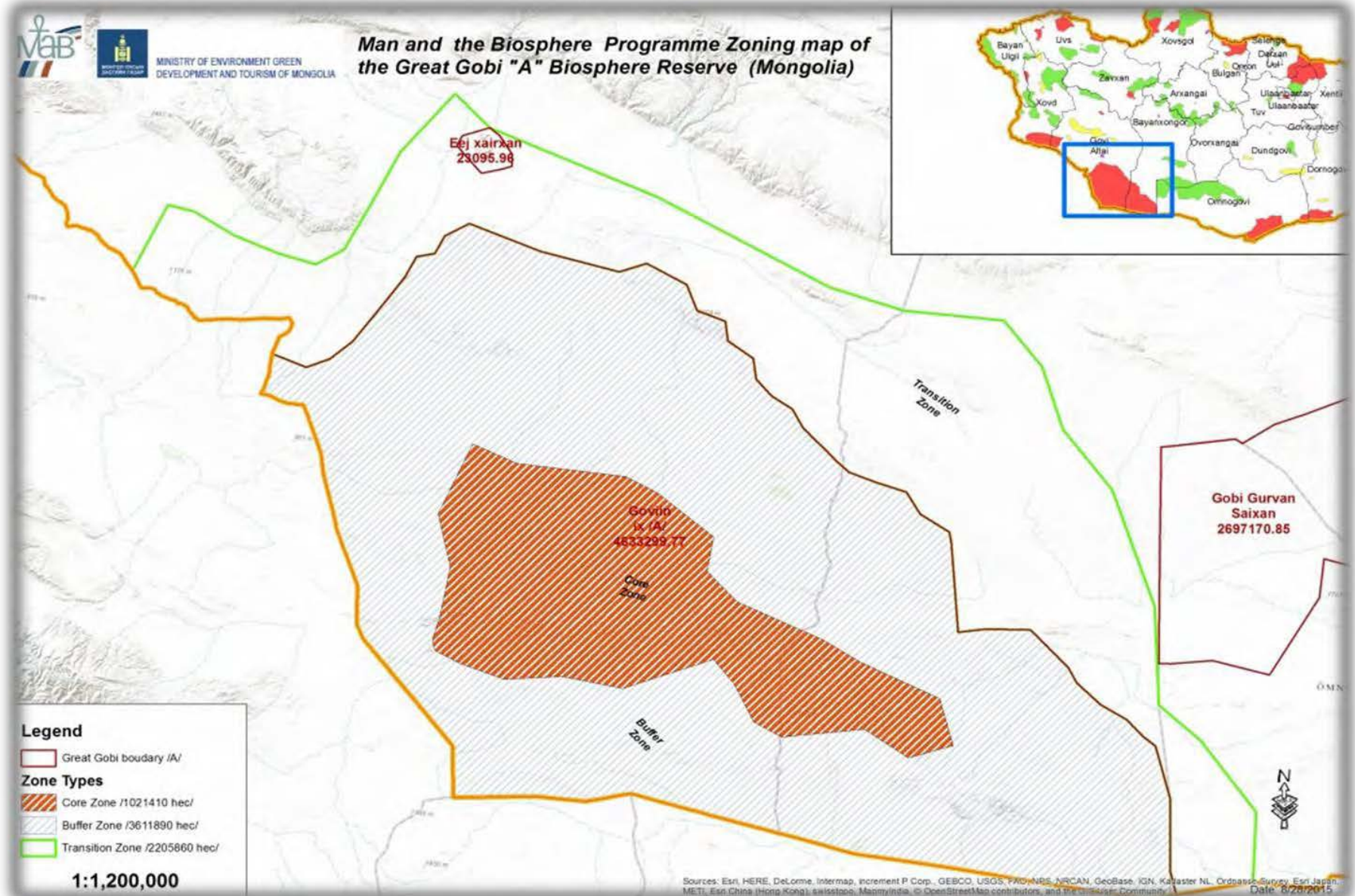


Comparison of zonation of BRs of UNESCO and SPAs of Mongolia



According to Madrid Action Plan, minister of MET approved order for new zonation on BRs of Mongolia.

Great Gobi "A" Biosphere Reserve

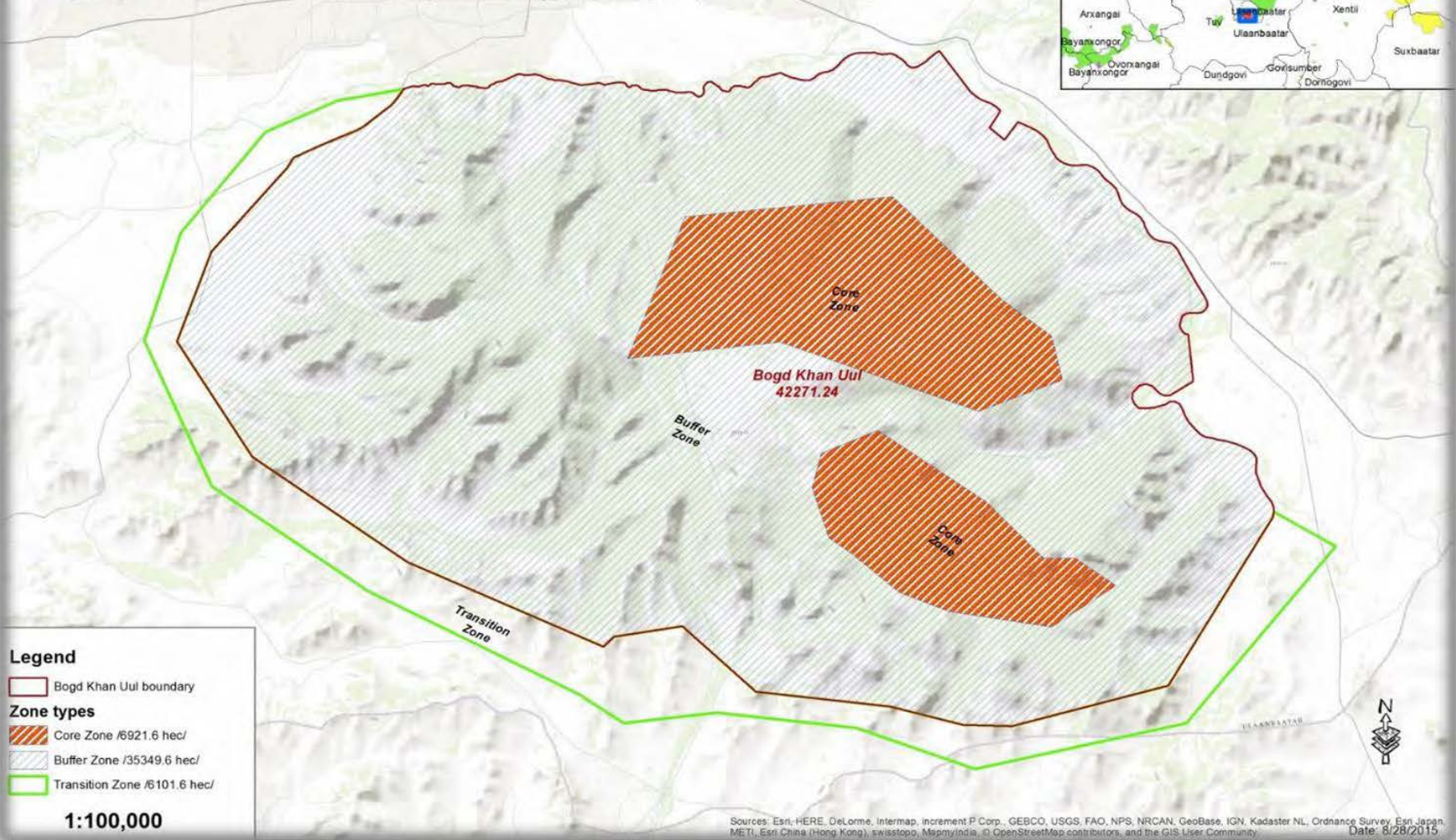


Bogd Khan Uul Biosphere Reserve

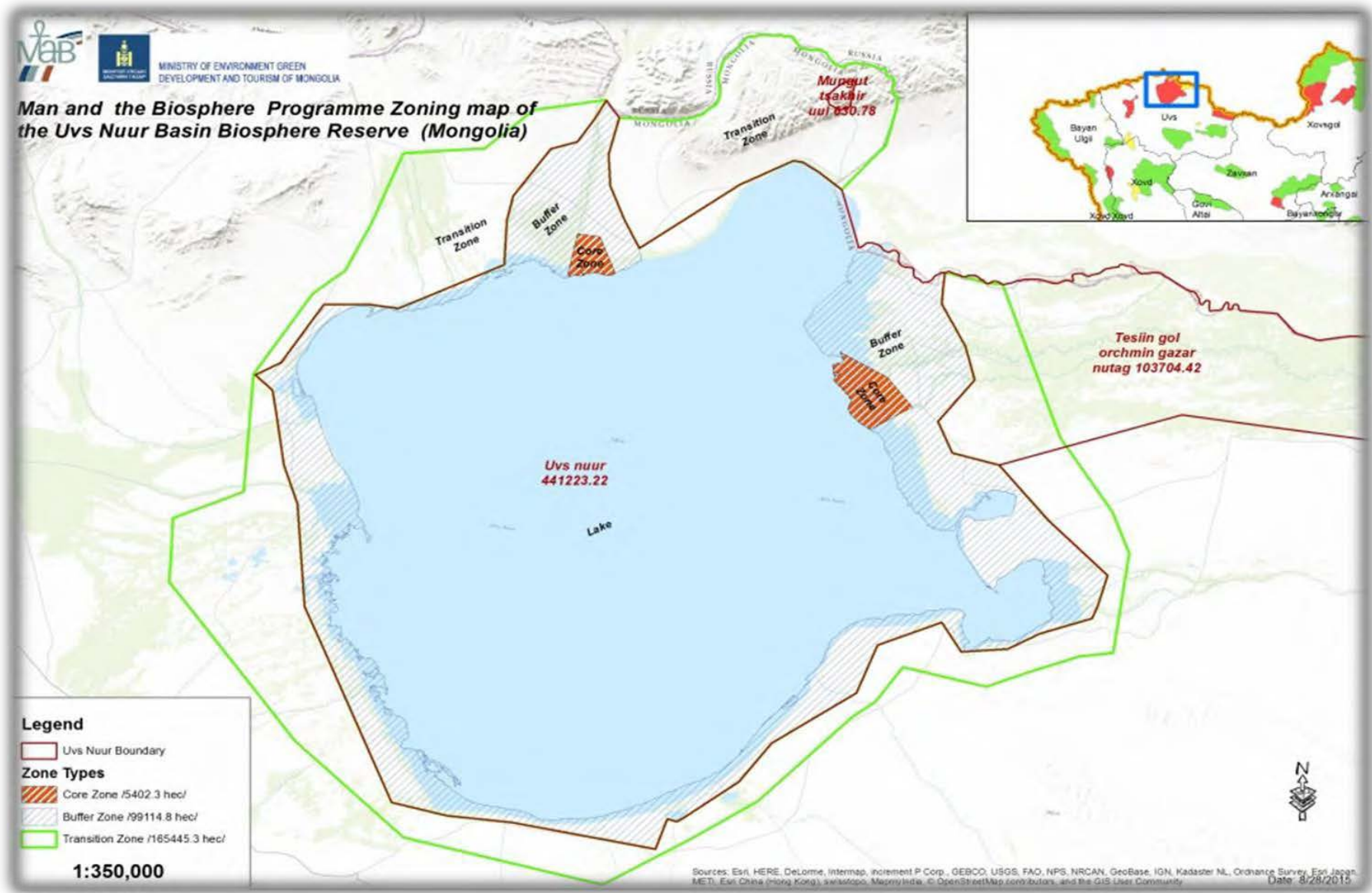


MINISTRY OF ENVIRONMENT GREEN
DEVELOPMENT AND TOURISM OF MONGOLIA

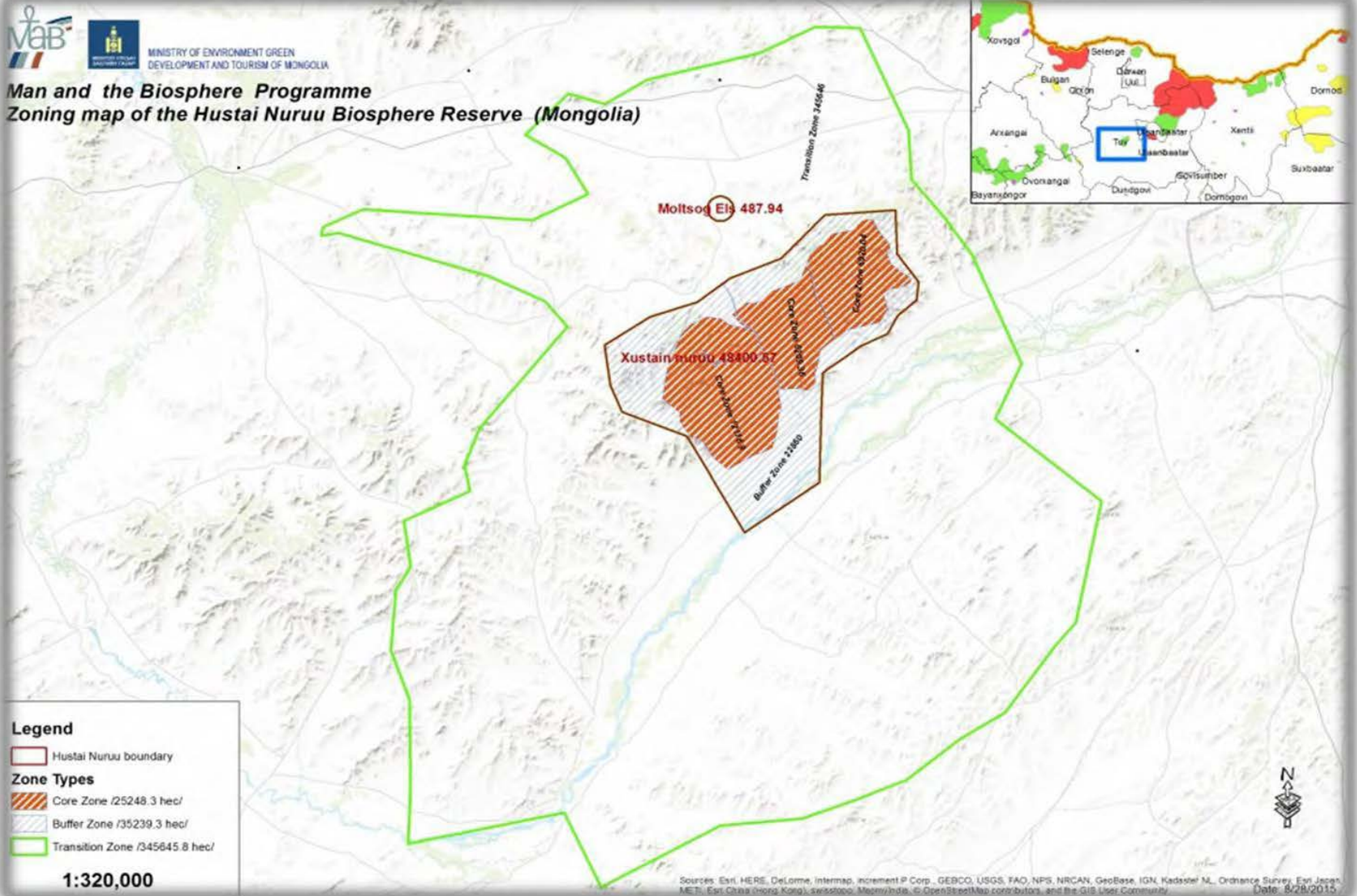
Man and the Biosphere Programme Zoning map of the Bogd Khan Uul Biosphere Reserve (Mongolia)



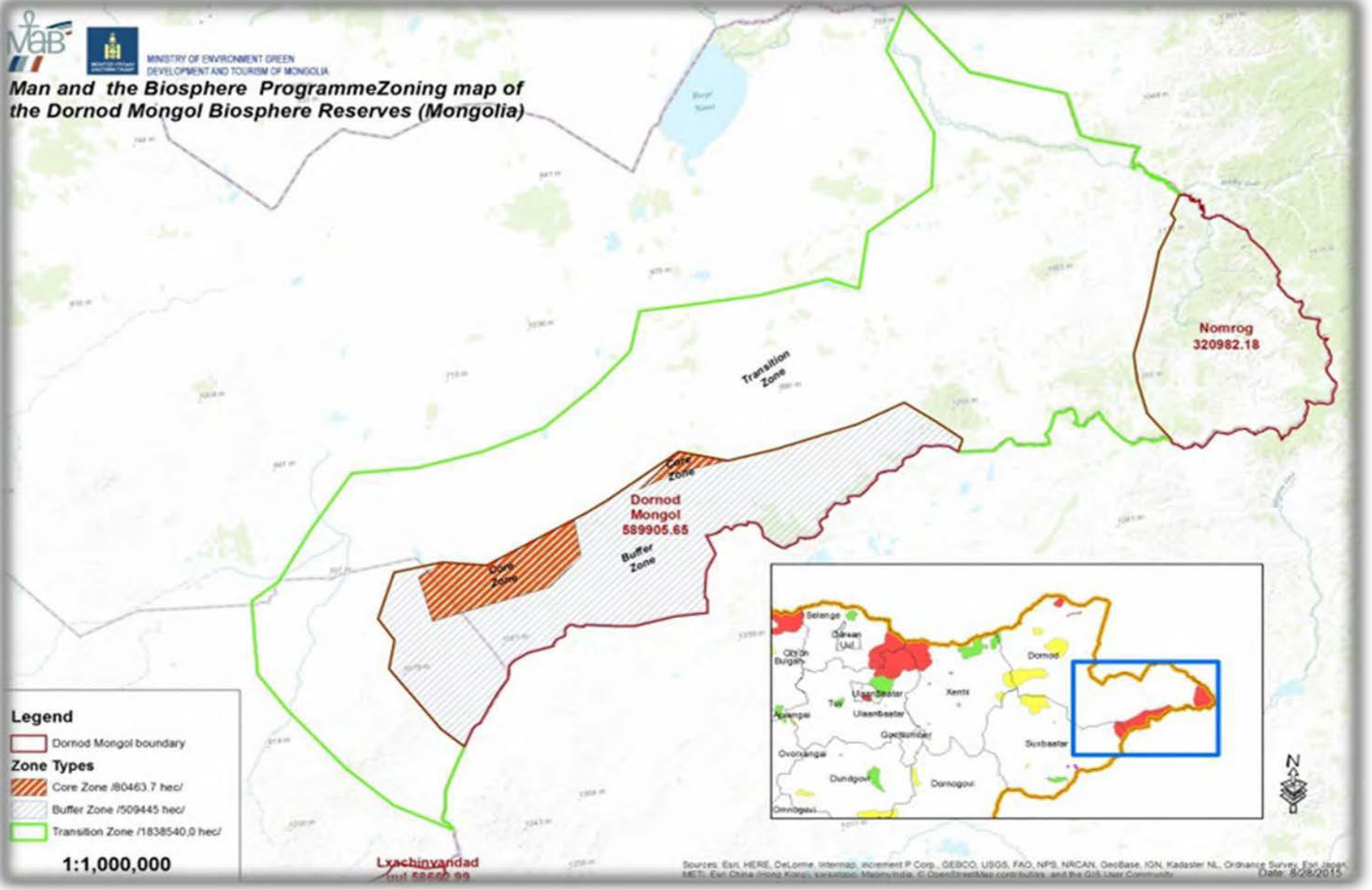
Uvs Basin Biosphere Reserve



Hustai Nuruu Biosphere Reserve



Dornod Mongol Biosphere Reserve



Actions in progress

- ❑ Problems and issues are mainly resolved via the support and cooperation of the projects even though the budget is limited
- ❑ The rule on activities of the Mongolian National Committee of the MAB has been developed and approved
- ❑ The year of 2016 has been announced as the Year of Transition Area
 - with the aim to improve the protection and buffer of the Transition Zone.
- ❑ Measures to improve the Internet and electrical access MAB areas is
 - in progress

Actions in progress

- With the aim to revise the neighboring two countries and during of which the parties have exchanged with best practices, experience and relevant information.
- Promotional and advertising purpose in the official website of the MAB Mongolian National Committee.
- Promote entities joined the MAB (Onon Balj NP, Toson Khulstai NR, Khar Us Lake NP, Khuvsgol Lake NP)
- Mongolian Government and German KfW bank's joint project is implementing to strengthen Mongolian SPA's
- More financial and technical support needed from UNESCO to Improve Mongolian BRs.



MINISTRY OF ENVIRONMENT
AND TOURISM



**Thank you for
your attention!**

IWRM Implementation for Water Security under SDG 6

Soontak LEE

Distinguished Professor, Yeungnam University, Republic of Korea
President, International Hydrologic Environmental Society (IHES)
Governor, World Water Council (WWC)

Sustainable Development Goals(SDGs) and SDG 6

Towards the 2030 Agenda: 17 SDGs for people-planet-prosperity-peace-partnership



On September 25th 2015, countries adopted a set of goals to end poverty, protect the planet, and ensure prosperity for all as part of a new sustainable development agenda. Each goal has specific targets to be achieved over the next 15 years.

Sustainable Development Goals(SDGs) and SDG 6

The “water goal” SDG 6

Ensure availability and sustainable management of water and sanitation for all



Water Security

◆ UNESCO

Water security is defined as the **capacity of a population a) to ensure access to adequate quantities of water of acceptable quality for sustaining human and ecosystem health on a watershed basis, and b) to ensure efficient protection against water related hazards (floods and droughts)**. In this context, water security is an increasing concern arising from population growth, drought, floods, degradation of water quality, and climate change (IHP-VIII “*Water security : Responses to local, regional, and global challenges*”)

Key Words for Water Security

- ◆ **Ensuring**
 - Water Supply in terms of both quantity and quality
 - Healthy aquatic ecosystem
 - Sustainable development and economic growth
- ◆ **Protecting civil society from**
 - Water related disasters, especially driven from climate change

Integrated Water Resources Management(IWRM)

Why Integrated ?

Why Integrated?

Everything is Connected

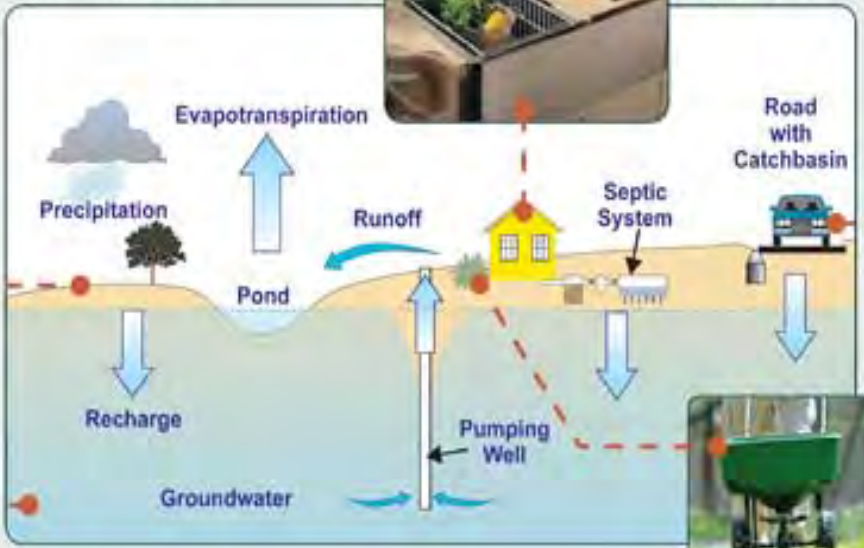


Animal waste...
Also makes it to surface waters.



From the groundwater...
Back to your tap!

How you manage your property has a direct impact on water quality



From the kitchen sink...
'To the septic system...
'To groundwater!



From an oil leak under your car...
To the road drainage...
To a surface water!



From your lawn...
To groundwater and/or
ponds and coastal waters.

Key concept and Issues of IWRM

Changing Paradigm and the Needs for IWRM

- Water resources for economic growth
- Construction of water supply facilities
- Water treatment facility expansion
- Simple engineering problem
- Government-led management



- Water for sustainable development & management
- Water supply and demand management
- Considering environment and ecology
- Multi-sectoral problem (social, econo., & env.)
- Participation of interested parties(Consensus)

👉 **Basinwide IWRM considering surface/groundwater, quantity/quality, water and adjacent land (Agenda 21 from UNCED, 1992)**

IWRM Definition

“A **Process** which promotes the coordinated development and management of water, land and related resources, in order **to maximize the resultant economic and social welfare** in an equitable manner **without compromising the sustainability of vital ecosystems**”

☞ **A continuum of PROCESS** as a way of avoiding or resolving conflicts over water (not as a finished & inviolate set of projects!)

☞ as a way of achieving **3 key goals: equity, efficiency, sustainability!**



General Objectives for IWRM

- **Stable water supply for municipal, industrial and irrigation uses**
- **Flood mitigation**
- **Water quality management (rivers, reservoirs)**
- **Management of river & lake environment, ecology (habitats, bio-diversity)**
- **Hydropower Generation**
- **Recreation**

Directions for IWRM

Conventional Water Resources Management

Surface water focused management

Single reservoir operation focused on water quantity control only

Lack of consideration for environment and future generation

Poor public participation and cooperation among water agencies

Lack of integrated management information system



Integrated Water Resources Management

Integrated management of surface water, ground water, alternative water resources

Comprehensive River-Reservoirs Operation considering water quantity, quality, basin water environment

IWRM considering Basin Water Management Efficiency, Equity. & Sustainability

Encouraging co-work system among local society and related agencies

Share of integrated information management system

IWRM Implementation

◆ Comprehensive Framework of Basinwide IWRM

- **River basin focus**
- **Managed risk for water development & operation**
- **Coordinated actions between water agencies** in a regulated environment
- **Capacity building to encourage local responsibility**
- **Local responsibility** to the maximum extent appropriate
- **Voluntary and cooperative actions**
- **Maximum use of market mechanisms to allocate and price water resources**

Implementation Process (I)

National

1. IWRM Strategy
2. National water resources planning in terms of IWRM
3. Efforts on legislating Basic Water Law

Capacity Building

1. IWRM Knowledge management system
2. E-learning contents & web-based education
3. NGO's small-stream rehabilitation program

Local

1. On-site application
2. Establishing a water management committee and preparing a legal directive

IWRM

Implementation Process (II)

First, it is to systematize the methodology to set an aim for an IWRM for making the guideline for planning an IWRM :

- **Improvement direction in domestic water resources management due to the changed structural condition**
- **Items required to new water resource management method (IWRM)**
- **Scheme to construct infrastructure for implementation of IWRM**
- **Prerequisite for implementation of IWRM**
- **Factors to be considered in setting aims of IWRM**
- **Level of goals to execute IWRM**
- **Making evaluation standards on implementation goal of IWRM**

Implementation Process (III)

Second, it is to get consultations on interrelation among each system and the left-out factor in order to draw up the layout of IWRM system:

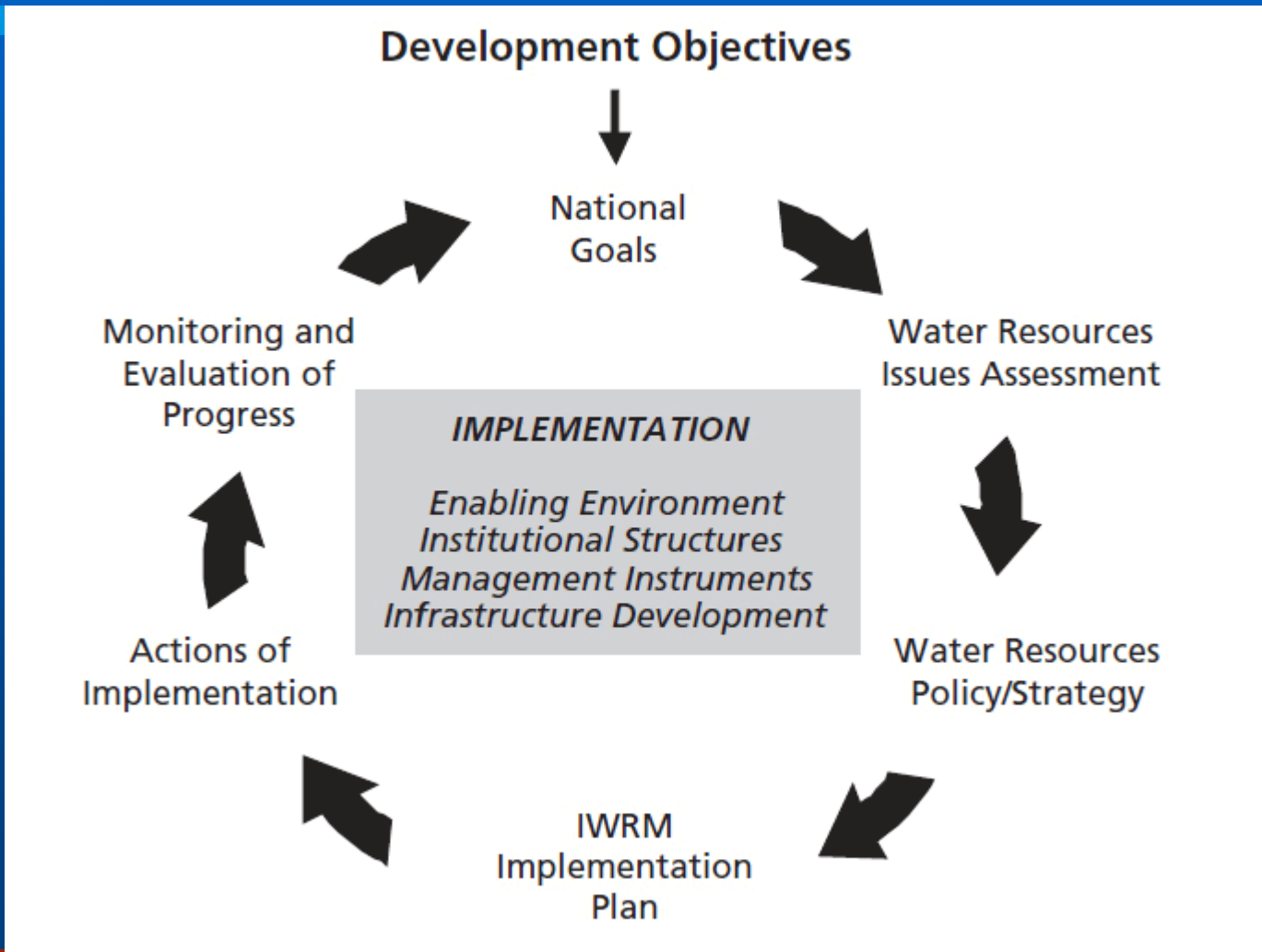
- **Establishment procedure of BMP(Best Management Practice) according to the identification of the optional alternative**
- **Evaluation method of BMP**
- **Physical estimation process that can reflect the selected target**
- **Selection of configuration model required for a physical estimation process and ability evaluation**
- **Social and economical estimation process that can reflect the selected target**
- **Selection of configuration model required for a social and economical estimation process and ability evaluation**

Planning Cycle and Implementation

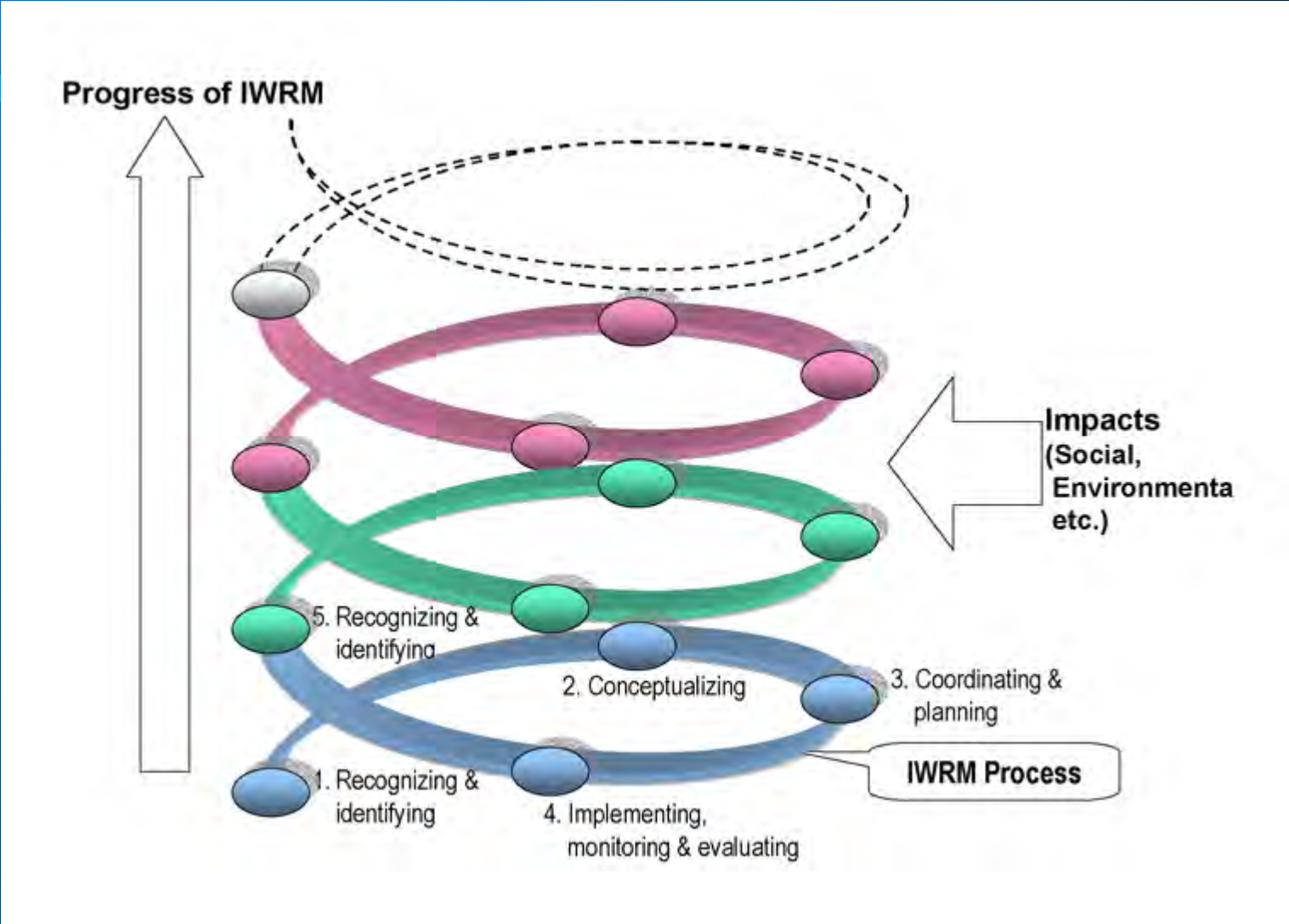
The IWRM Planning Cycle



Planning Cycle and Implementation



IWRM Spiral Model





United Nations
Educational, Scientific and
Cultural Organization



International
Hydrological
Programme



**International
Hydrologic
Environmental
Society (IHES)**

***THANK YOU
FOR
YOUR ATTENTION !!***

Climate change impacts on water resources and adaptation measures in Mongolia

G. Davaa, P.Gomboluudev, A.Batbold, D.Oyunbaatar, G.Oyunkhuu and B.Eredenebayar, Institute of Information and Research Institute of Meteorology, Hydrology and Environment (IRIMHE), Ulaanbaatar-46, Mongolia, E-mail: watersect@yahoo.com



Climate change impacts on water resources and adaptation measures in Mongolia

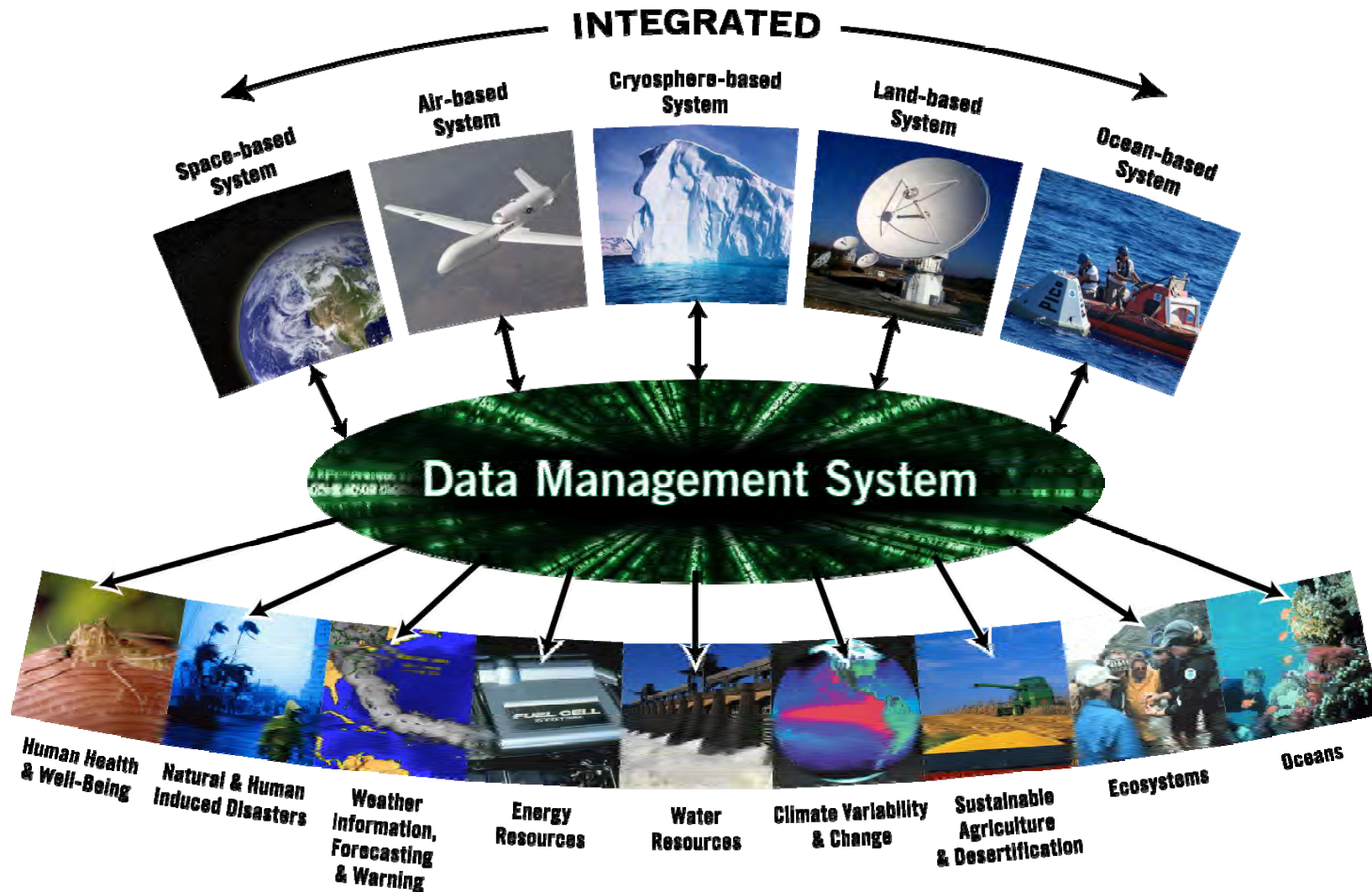
G. Davaa, P.Gomboluudev, A.Batbold, D.Oyunbaatar, G.Oyunkhuu and B.Eredenebayar, Institute of Information and Research Institute of Meteorology, Hydrology and Environment (IRIMHE), Ulaanbaatar-46, Mongolia, E-mail: watersect@yahoo.com



Contents

- 1. Currently observed climate changes and water resources situation**
 - **Rivers**
 - **Lakes**
 - **Glaciers**
- 2. Climate change projections and possible impacts**
- 3. Adaptation measures and SDG**

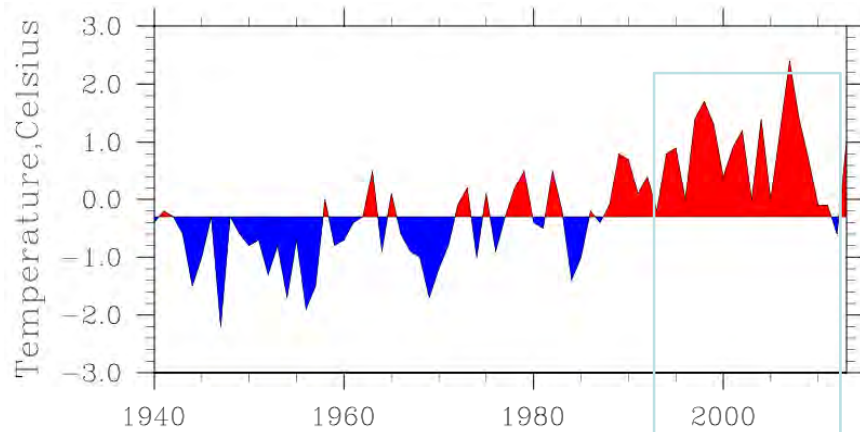
GEO/GEOS: International platform



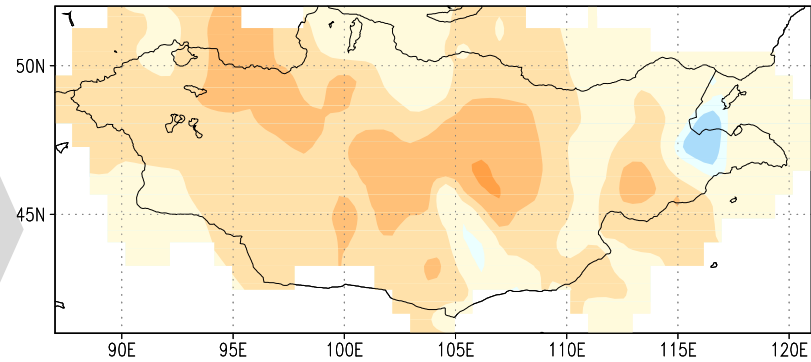
Mongolia has got member of GEO. Data integration and assimilation activities are on going including geographic data of rivers, lake and glacier network, their hydrology, glaciology, climate data and MOLTS data in Mongolia.

Present climate change: Present change, 1940-2013

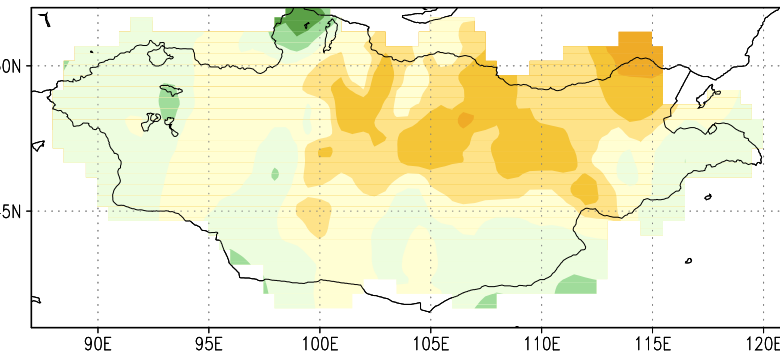
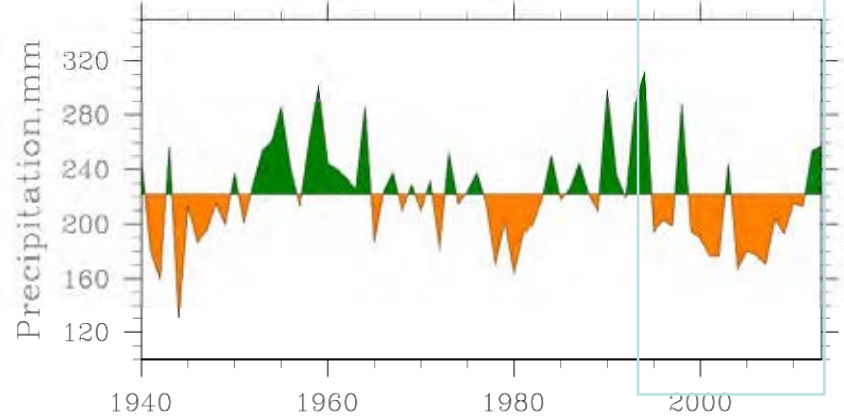
Annual mean temperature including 40 meteorological stations



Spatial pattern



Annual precipitation including 40 meteorological stations



By Dr. P.Gomboluudev, 2014

- Annual mean temperature is increased by 2.1 °C (+2.6 °C in winter and +1.4 °C in summer)
- Annual precipitation is decreased by 10% (+24% in winter and -7% in summer-)
- Convective precipitation is getting more dominant

Hydrological monitoring and research

Experiment

- Water balance experimental sites
- Glacier mass balance
- Soil moisture (Mongol AMSR-E/AMSR2/ALOS Validation Experiment)

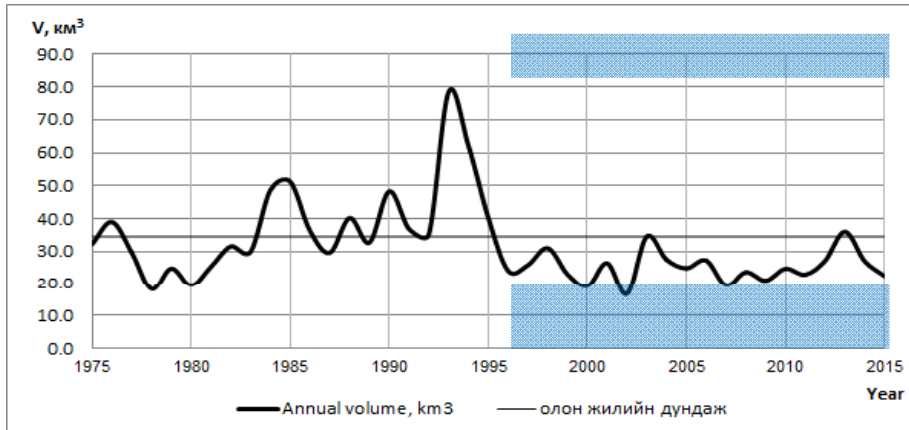
Observation

- Climate in high mountains
- Lake and glacier area retrieved by satellites
- Water quality and regime
 - Rivers
 - Lakes
 - Glaciers
- Permafrost
- GIS data of lakes, rivers and glaciers

Modeling

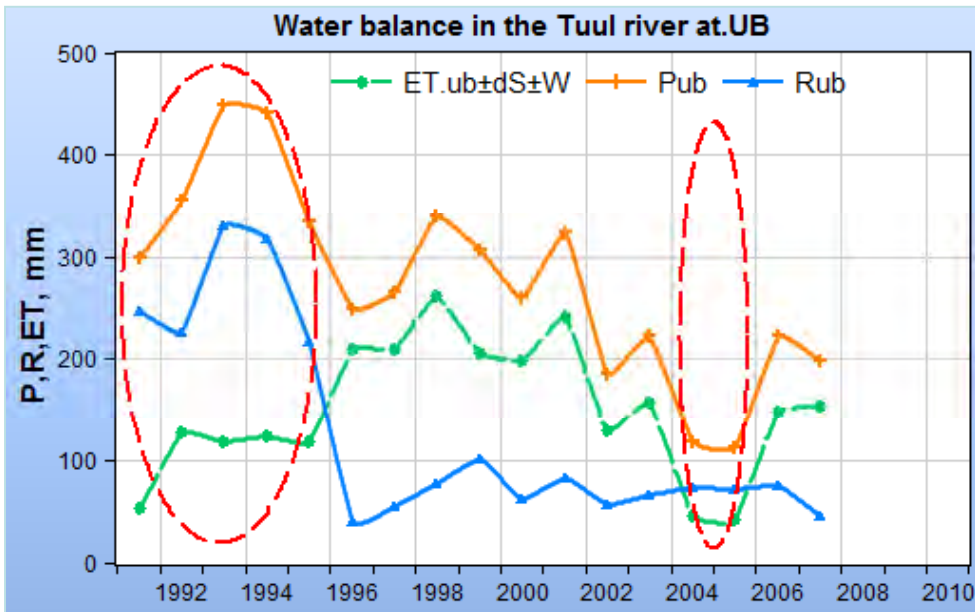
- WEB
- Land surface model
- Statistical analysis

Present water resources situation (Rivers)

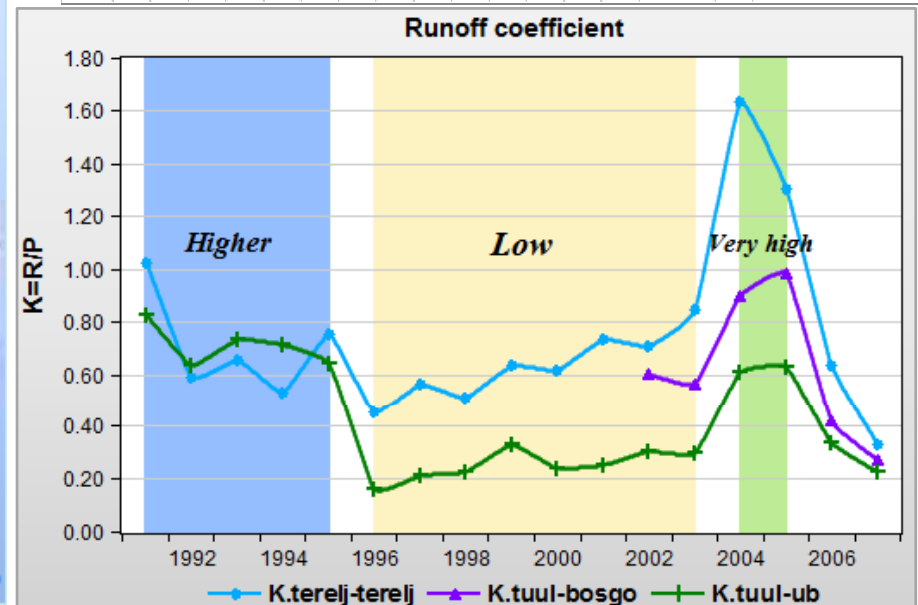
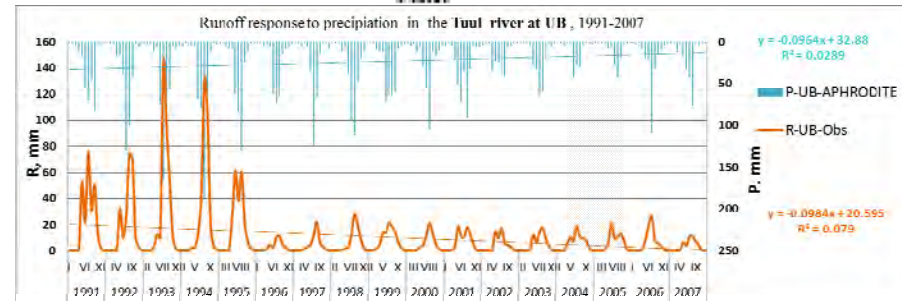
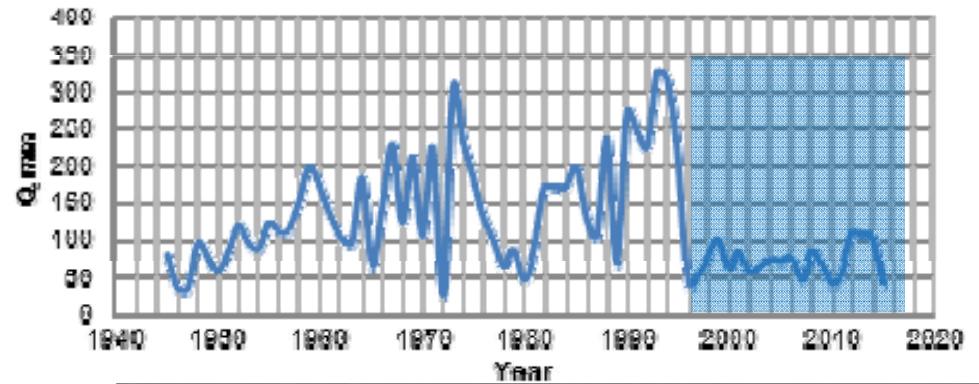


Annual volume of total river water variation, cub.km/year in the country (34.6 cub.km/y)

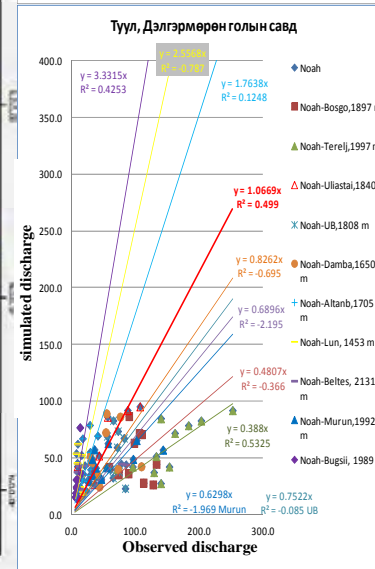
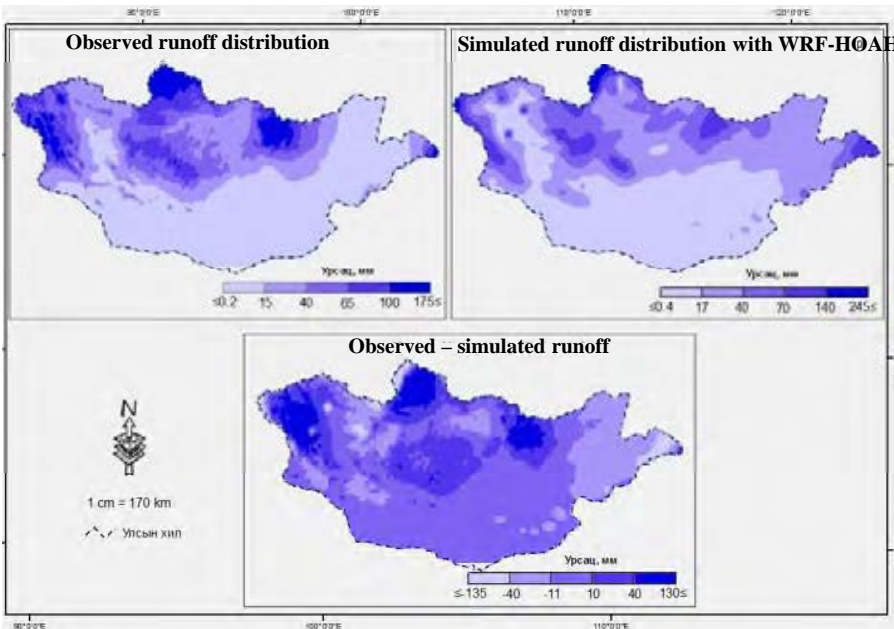
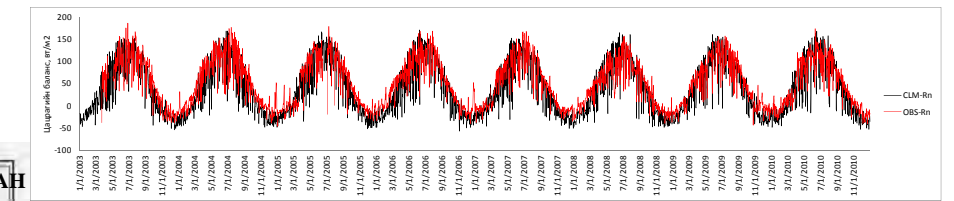
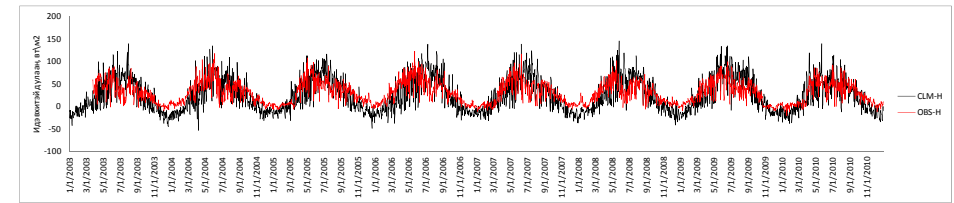
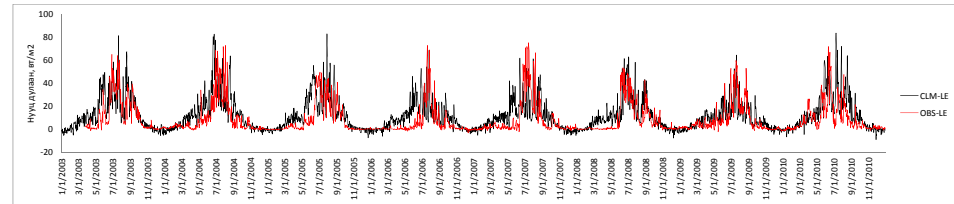
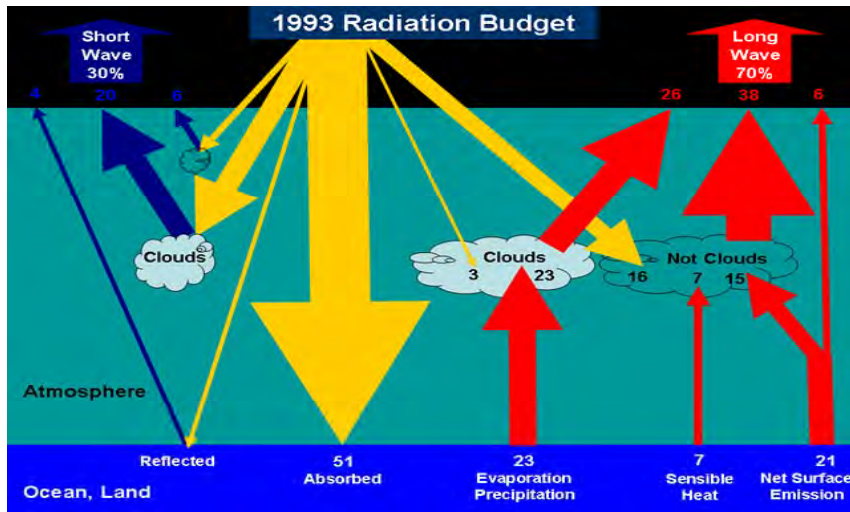
Runoff coefficient dynamics show well distinguished 3 periods of water balance condition as below line chart.



Runoff of the Tuul river at UB, mm



Validation of water and energy budgets with WRF-NOAH and Reg.CM-CLM models



- Simulation of energy and water balance provides *discarbances* in comparisons with observation.
- Errors are river basin specific, depending upon basin characteristics.
- Future model parameterization and downscaling are needed.

Regime changes

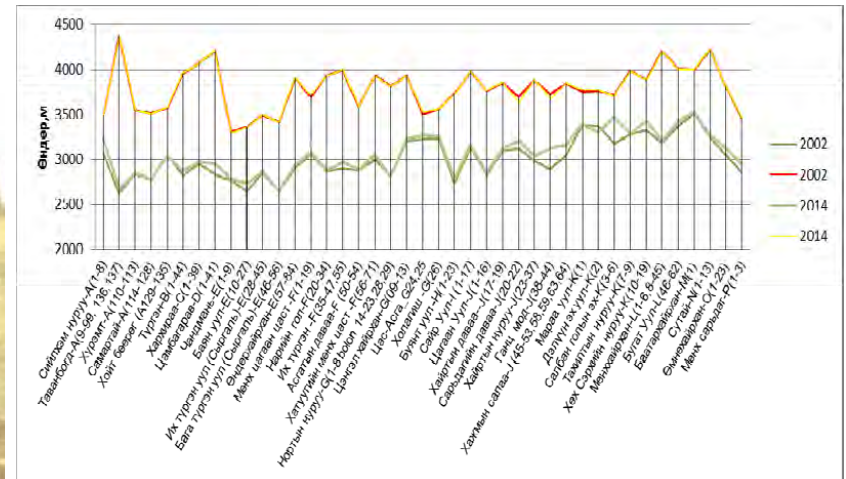
Current changes in water regime of rivers can be classified into 4 types of changes occurring:

1. Rivers where, annual and seasonal flows are increasing (streams draining from glaciers)
2. Rivers where, spring and summer flows are decreasing and autumn and winter flows are slightly increasing (rivers located in continuous and discontinuous permafrost regions)
3. Rivers where, only winter flow is slightly increasing (downstream areas of big and bigger rivers)
4. Rivers where, all seasonal flows are decreasing (rivers, draining from arid and semi arid regions)

Statistically significant changes occur in starting and ending dates of ice phenomena occurrence (starts by 5-10 days later, ends earlier by 3-4 days), Dates of ice cover occurrence in autumn and spring are shifted. Accordantly, their durations and ice depth are shortened (by 10-15 days) and decreased (by 24 cm/year and that causes ice road accident due to ice breaks).

Water temperature of rivers has increased by 0.5-2.1°C in last 70 years. It intensified at rate of 0.16 °C/year since 1990 in nonglaciarezed basins.

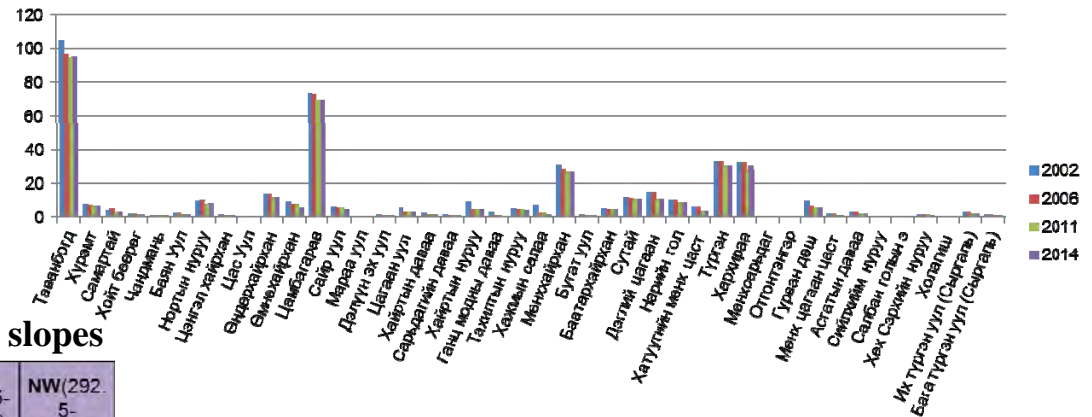
Glacier changes



Changes in lower (terminus) and top heights of glaciers

Mongolian glaciers are distributed in 42 Mts. massive with water resources of 19.4 cub. km

ML statistical method in ENVI (Richards, 1999) has been used for glacier area determination using LANDSAT images.



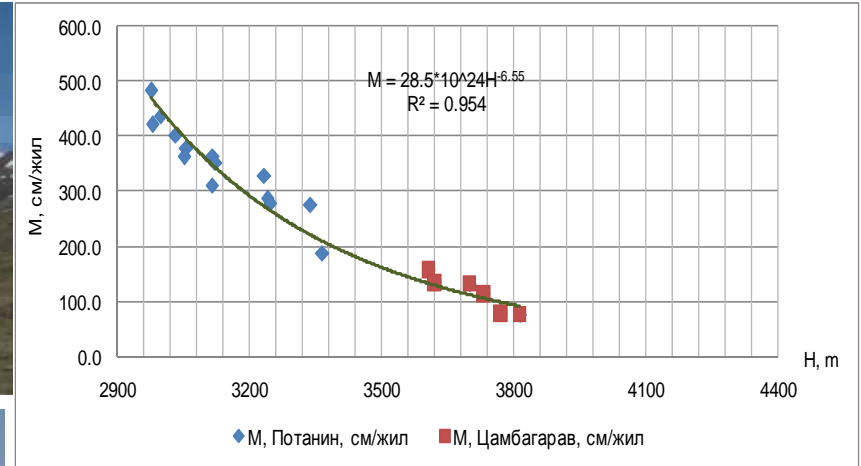
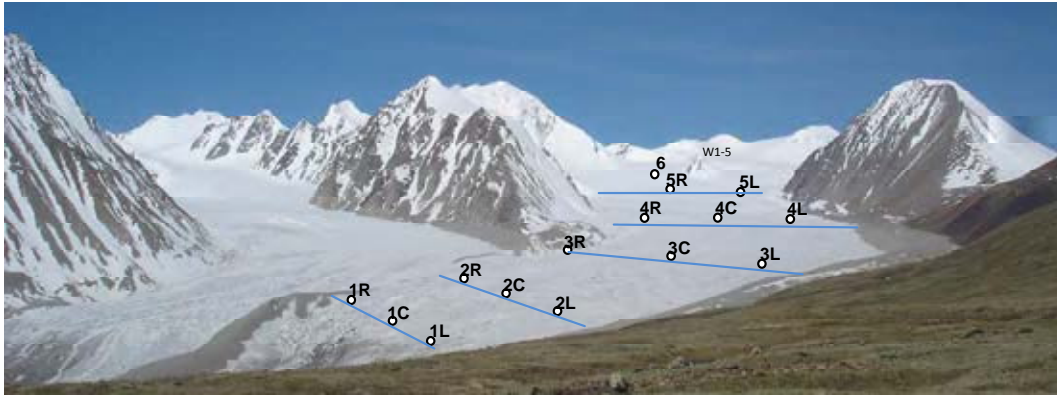
Changes in areas of glaciers (29.9 % in 1940th-2014)

Total glacier area changes in directions of mountain slopes

	N(0-22.5°C), (337.5-360°C)	NE (22.5-67.5°C)	E (67.5-112.5°C)	SE (112.5-157.5°C)	S (157.5-202.5°C)	SW (202.5-247.5°C)	W (247.5-292.5°C)	NW(292.5-337.5°C)
2002	110.1	134.1	84.6	46.0	21.3	12.0	15.1	35.9
2014	82.6	107.6	69.5	38.6	18.5	10.5	11.4	28.0
dA	17.5(16.9%)	26.4(19.7%)	16.1(17.8%)	7.4(16.0%)	2.8(13.0%)	1.5(12.3%)	3.8(26.0%)	-7.9(21.1%)

Glacier top height hasn't been changed in 20 mountains. The height has been decreased by 2 m on average in 22 Mts. in 2002-2014. All glaciers retreated by 49 m on average in this period.

Glacier mass balance observation at selected glaciers



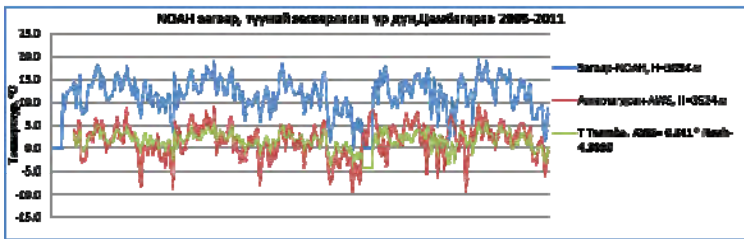
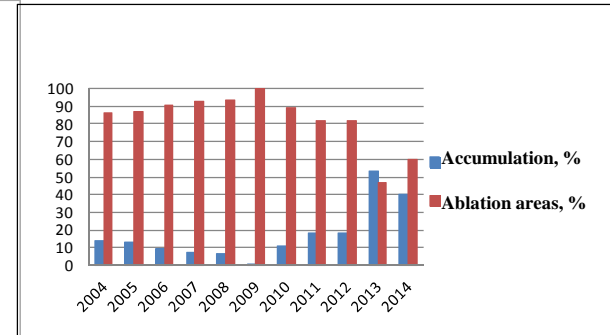
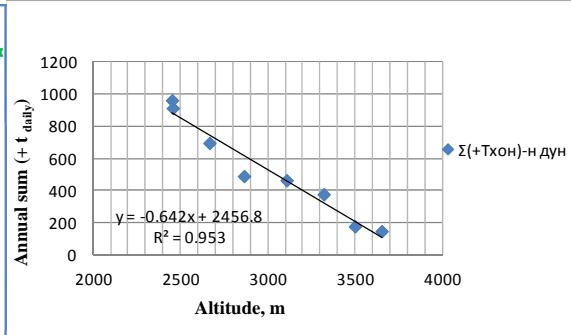
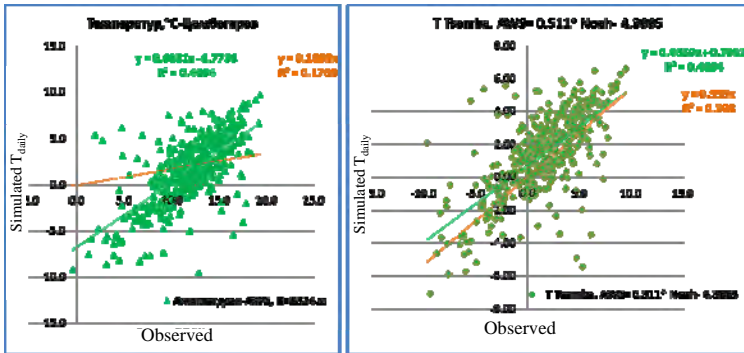
Observations 2003-2016 by Local HMEMC, IMHE at 5 Mts. glaciers (Flat top, valley and corrie glaciers)

- stake measurement on lower/middle and top of the glacier in June-Sept.
 - Radio-echo soundings, 2 times made
 - ice thickness at the stakes
- Ice flow (surface velocities) in Sept.
- Hydrological station at the stream-
- Meteorological data collection with AWS – 2004-2016

AANDERAA, Campbell-1, Campbell-2, 1 hour, 30 min. 3654 m and Campbell- 2015, 2804 m



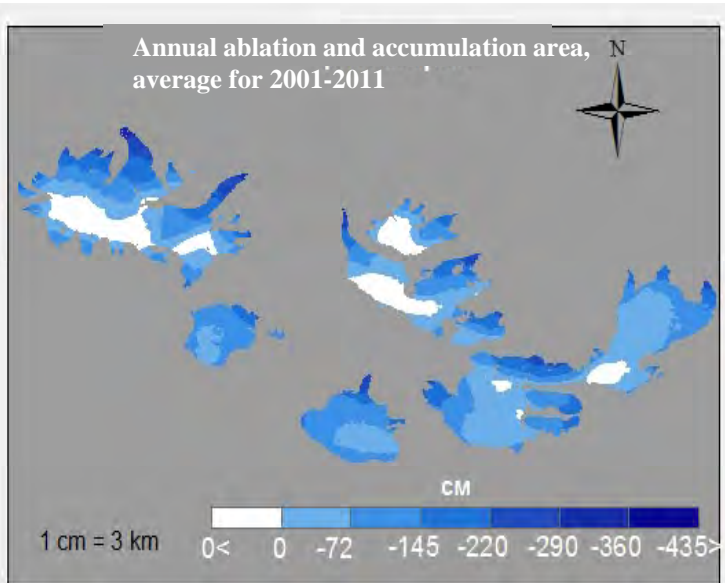
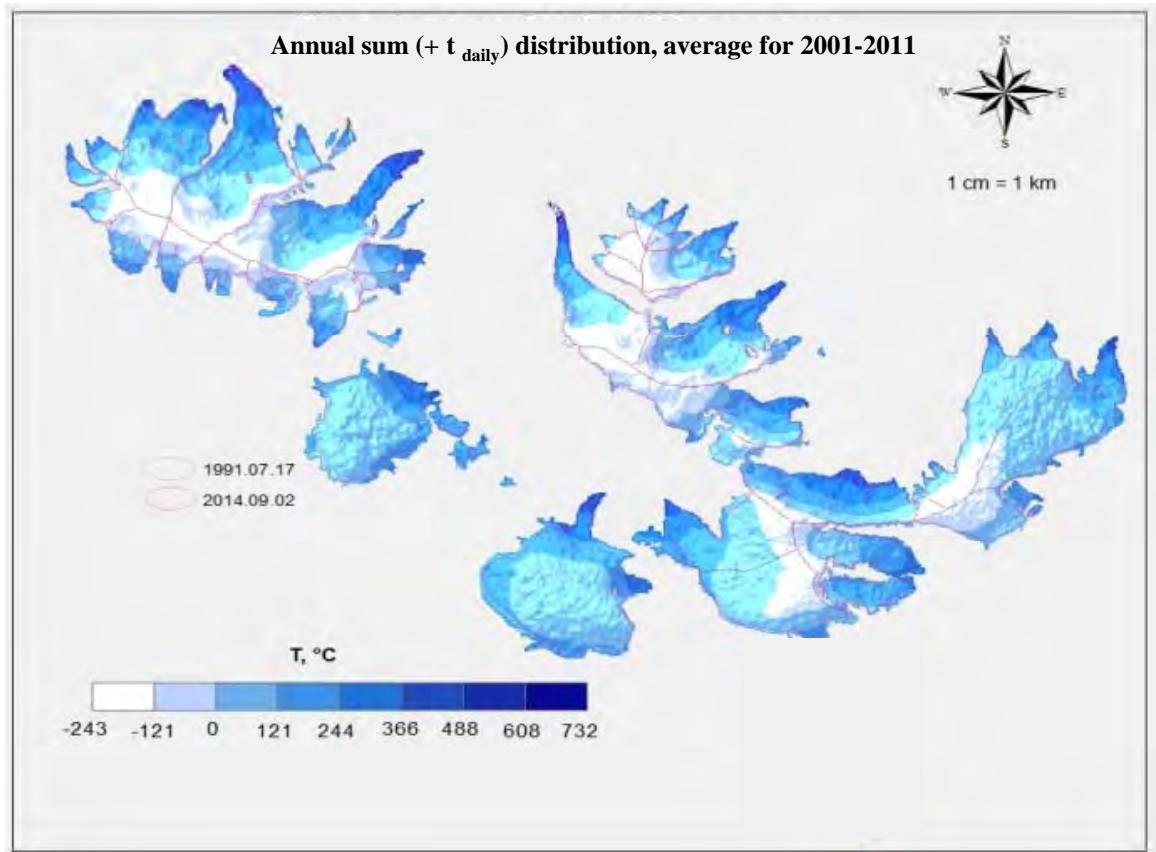
Glacier mass balance simulation



Annual sum (+ t_{daily}) vrs. altitude

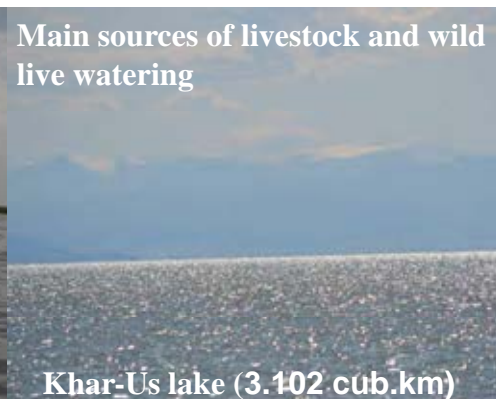
Ablation and accumulation areas, %

Air temperature, observed and simulated with WRF, before and after bias correction

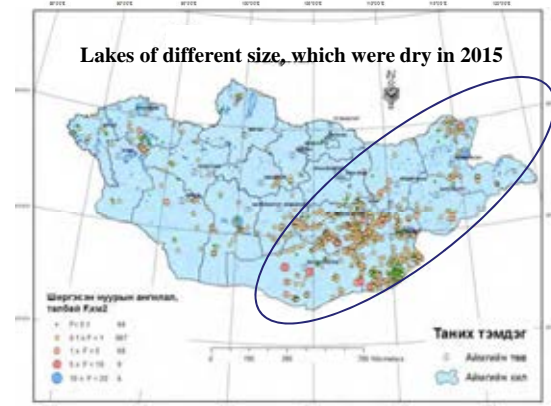
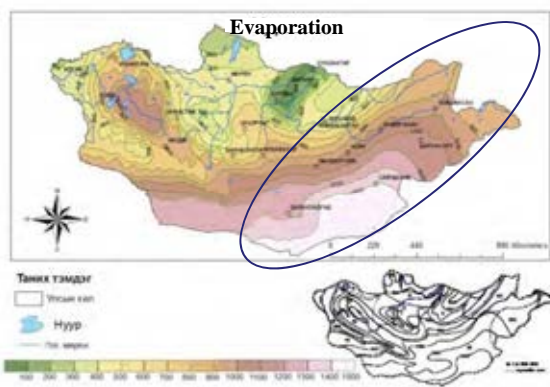
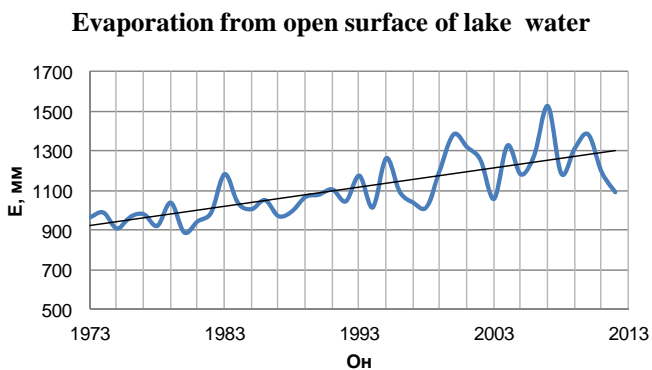
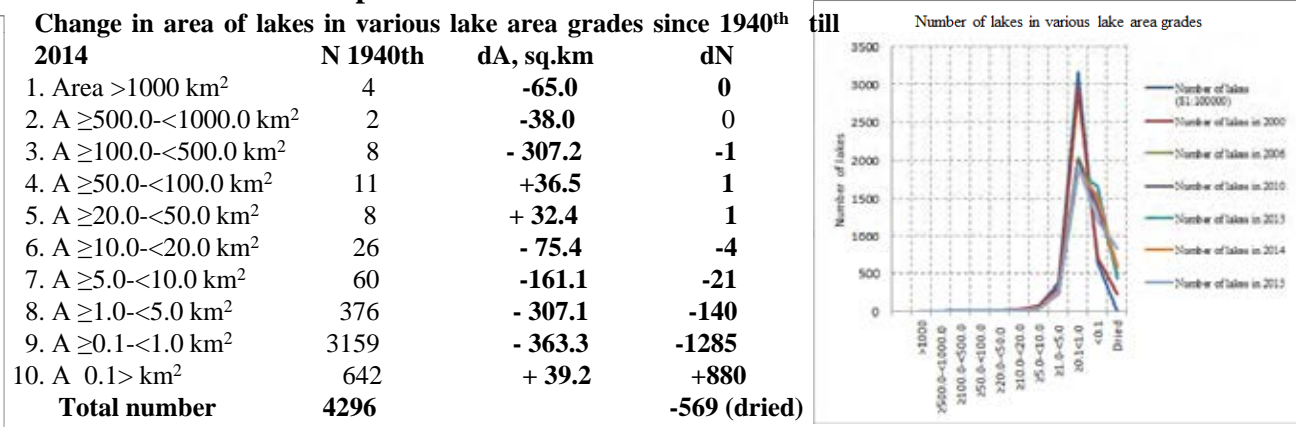
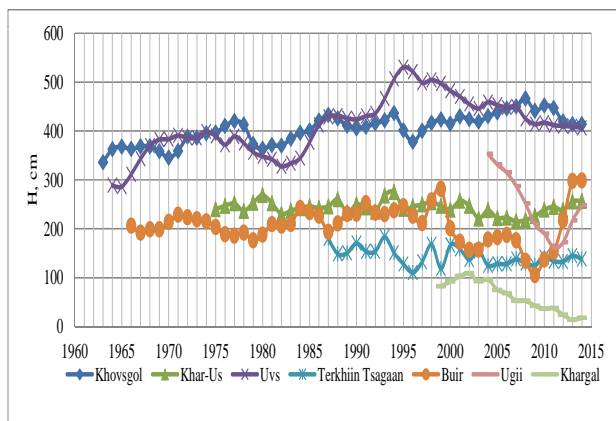


Annual ablation area in the Mts. reaches 45-100 % of Tsambagarav glacier area in 2004-2014.

State of lakes (Natural water reserve of 500 cub. km)

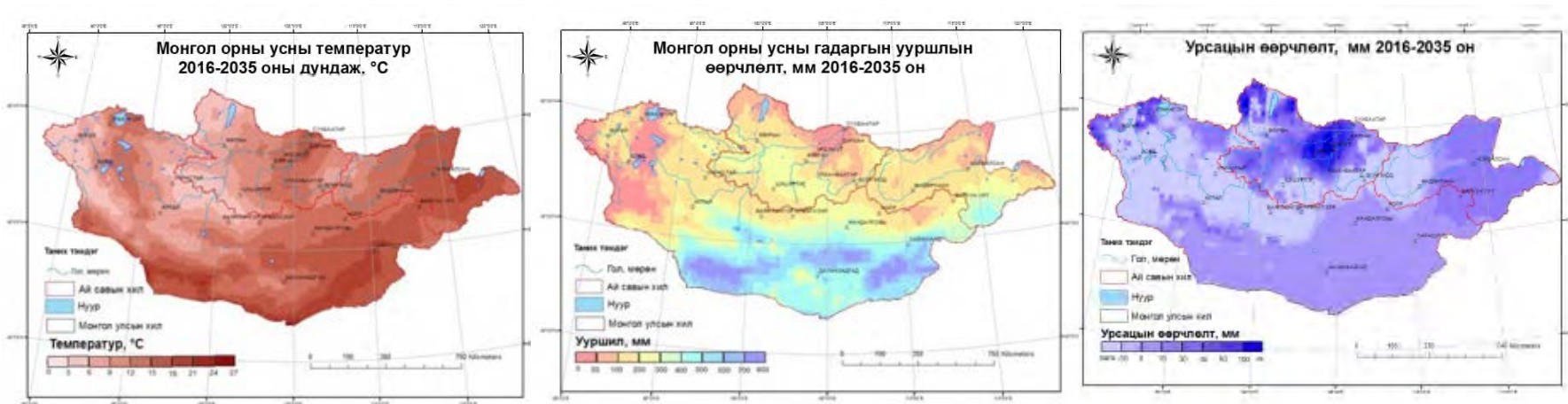


Numbers and areas of lakes, acquired from topographic map, scaled S1:100000, compiled in 1940th and acquired from LANDSAT TM and ETM satellite data of 2000, 2006, 2010, 2013-2015 have been compared.



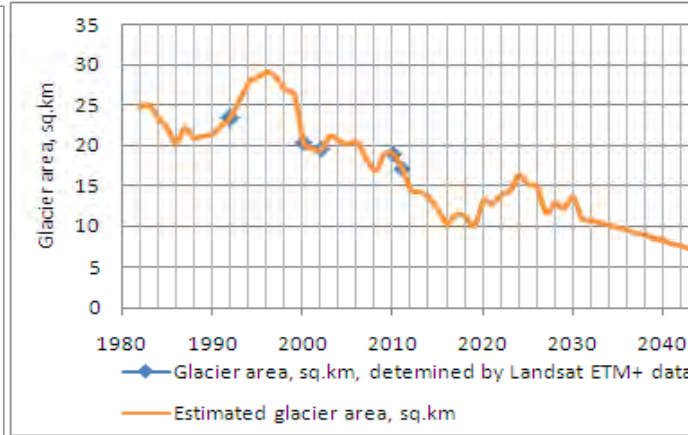
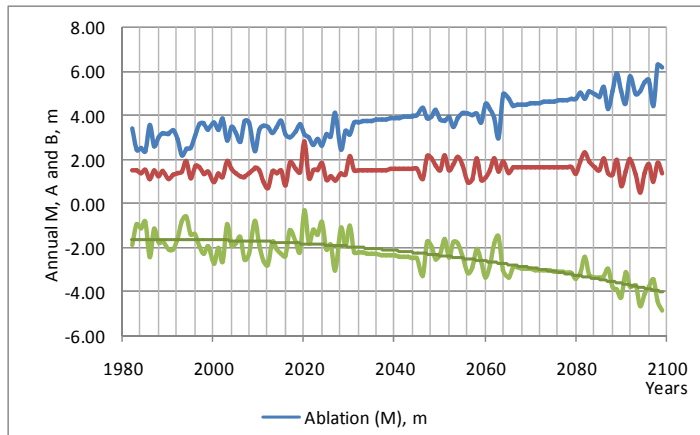
Climate change impact assessment on water resources

ECHAM5-GCM-Reg.CM4 for Greenhouse emission scenarios (RCP8.5) have been used for climate change projection in 2020 (2016-2035), 2050 (2046-2065) and 2080 (2081-2100) (P.Gomboluudev, 2015). These and current climate and hydrological data have been used for climate change impact analysis on water balance projection.

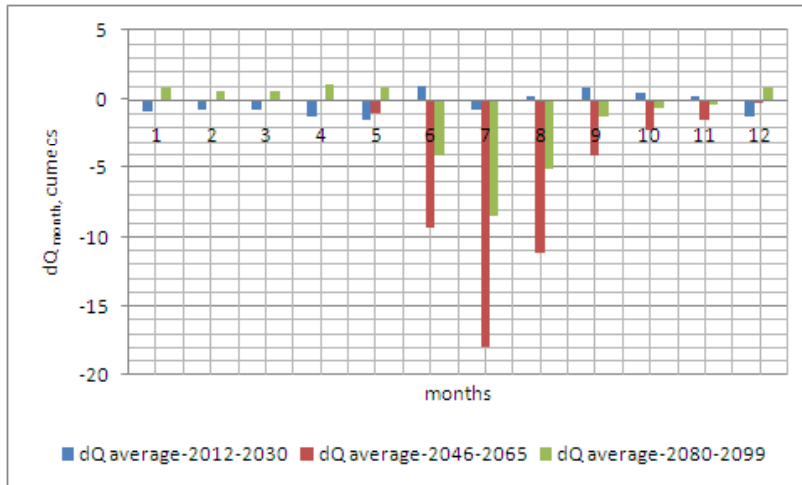


	Changes in evaporation from open surface water, mm			Changes in water temperature, c			Runoff change (May-October), mm		
	dE, 2016-2035, мм	dE, 2046-2065, мм	dE, 2081-2100, мм	dt, 2016-2035, ° C	dt, 2046-2065, ° C	dt, 2081-2100, ° C	dh, 2016-2035, ° C	dh, 2046-2065, ° C	dh, 2081-2100, ° C
Major River basins									
Arctic Ocean basin	143.5	162.3	221.6	0.5	1.1	2.4	31.8	38.2	41.6
Pacific Ocean Basin	164.7	364.5	370.2	0.6	1.5	3.0	5.0	7.0	7.4
Central Asian Closed basin	106.8	96.1	150.2	0.5	1.0	2.1	-2.0	0.6	2.7

Glacier area and runoff change projection



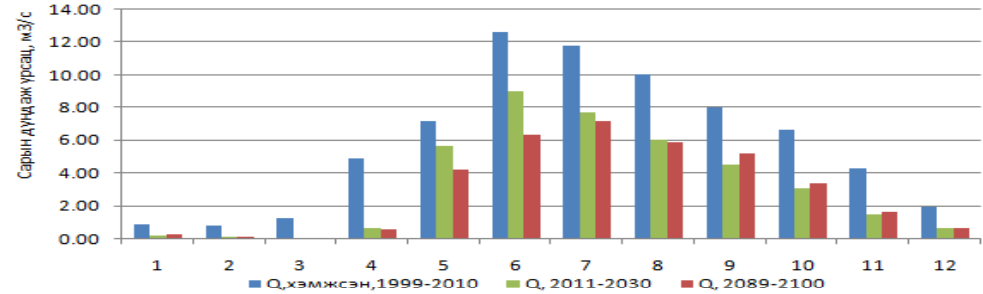
Projected mass balance of the Kharkhiraа glacier



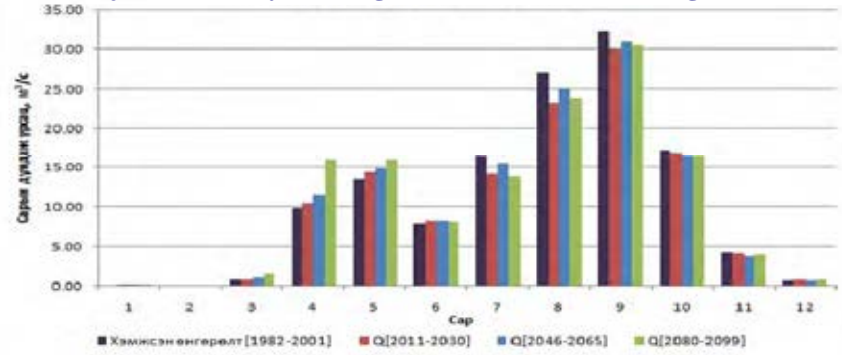
Projected glacier area decrease of the glacier

Monthly average discharge will increase by 9.0 percents in June, 2.2 percents in August and decrease by 4.0 percent in July, 2016-2030. In rest periods JJA discharges will be decreased significantly due to glacier melt and disappearance in Kharkhiraа river basin.

Projected monthly discharge of Buyant river, HbV, J.Odgarav, 2013



Projected monthly discharge of Ulz river, HbV, J.Odgarav, 2013



Impact study on main biophysical components

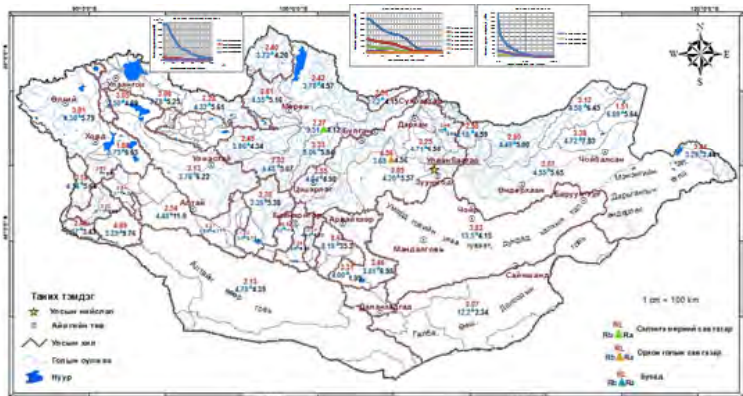
Biophysical components	Impacts
Natural zones	<p>Observed change: Satellite images show that the area without vegetation cover has increased by 46 percent in 2002 compared to the situation 10 year previous (MARCC, 2009).</p> <p>Expected change: Natural zones including the high mountains, the forest steppe, the steppe and the desert steppe are expected to change because of climate change (SNC Mongolia, 2010)</p>
Rangeland	<p>Observed change: It is estimated that around 70% of the total pasture land is degraded due to the fact that the number of livestock has almost doubled in the past 20 years (SNC Mongolia, 2010).</p> <p>Expected change: Studies on the impact of vegetation biomass change show that the biomass of pasture will decrease significantly in all regions, especially in the forest-steppe and steppe regions, except in the desert areas.</p>
Glaciers/ Snow cover	<p>Observed change: The change in the average depth of snow cover over the last 30 years shows that the snow depth has decreased in the northern mountainous regions of Mongolia (SNC Mongolia, 2010).</p> <p>The area of glaciers has already decreased by about 30 % since the mid 1940s and in the Mongol Altai, the lower edge of the glaciers is retreating (Davaa G. etc, 2007). The shrinkage of glaciers seriously affects the regime and resource of surface water bodies which originate from glaciers.</p> <p>Expected change: The area with snow cover lasting for more than 50 days during the winter accounted for about 62% of the total territory of the country in the second half of the 20th century; this proportion is expected to shrink to about 46% in the first half of this century and about 35% -in the middle of this century, respectively. Glaciers are expected to continue to shrink in the future due to climate change.</p>
Natural disasters/ climate extremes	<p>Observed change: Annual economic losses caused by weather-related natural disasters have increased in Mongolia. During the last decade the frequency of weather-related natural disasters has increased by 2-3 times and economic damages were estimated to be US\$10–15 million every year (excluding damage caused by drought and harsh winter –zud) (Natsagdorj L et al., 2003).</p> <p>Expected change: The tendency for increased frequency of climate extremes is expected to continue in the future (MARCC, 2009). As a result, drought and harsh winter (zud) is highly likely to occur more frequently, bringing risks for agriculture, and nomadic livestock.</p>
Forests	<p>Observed change: The area of forest affected by insects had increased nearly 3 times in the period 2002-2006 compared to the period of 1995-1999. Studies show there is some correlation between the size of forest area affected by pests and insects and the drought index.</p> <p>Some research on the frequency and aerial extent of forest and steppe fires, found no clear change in fire frequency or synchronicity in recent decades (Hessl, A.E., and etc, 2010).</p> <p>Expected changes: An increasing intensity of drought will result larger distribution of harmful forest insects in the near future in Mongolia.</p>

Impact study on main socio-economic sectors

Sector/ Area	Impacts and vulnerability
Animal husbandry	<p>Animal weights and sizes have decreased in recent decades because of increased drought frequency and pasture production decreases (Climate Change studies in Mongolia, 2003).</p> <p>Results of studies show that summer-autumn weight of sheep will decline by 10-27% during 2011-2039 and 24-38% from the level of 1961-1990 in the forersteppe and the steppe regions (Climate Change Vulnerability and Adaptation in the Livestock Sector of Mongolia, 2006). Due to climate change, an increasing number of very hot summer days has the potential to shorten the animal grazing period. It is expected that droughts and harsh winters will occur more frequently. If the necessary adaptation measures are not taken, by the middle of this century, the annual rate of livestock loss could reach 8 to12% on average.</p>
Arable farming	<p>Climate change has direct impacts on crop production including spring wheat, which is the main crop in Mongolia. Water availability is the main constraint factor for crop production in Mongolia because spring wheat is mostly grown in rain fed fields. Another factor causing yield declines is the rising number of hot spells during critical stages of crop growth. A climate change impacts study revealed a significant correlation between the number of days with temperatures higher than 26°C and the critical period – July for wheat crops.</p> <p>In climate change impacts study, the decision support system for agrotechnology transfer (DSSAT) 4.0 model was used to assess future trends of spring wheat yield. Due to faster crop growth under higher temperatures, the spring wheat growing period could be shortened by 3-5 days. Spring wheat yield would decline by 1-30% (on average 13%) over the period 2011-2030 from the current average yield under A1B emission scenario as run by the HadCM3 model (SNC Mongolia, 2010). Other factors such as spread of crop pests and diseases, hot spells and frequency of heavy rains would have an impact on crop production in future.</p>
Human health	<p>Some research initiatives were conducted in Mongolia in order to assess climate change impact on human health. Major findings include:</p> <ul style="list-style-type: none"> • Cardiovascular disease mortality and morbidity have increased. There is correlation between cardiovascular disease incidence and heat waves. • There is a correlation between angina pectoris and weather parameters, and between respiratory diseases, air pollutants and weather parameters. • There is correlation between climate parameters and water borne diseases. Drinking water quality which is one of the main drivers of water borne diseases has changed due to climate change. • Infectious diseases such as dysentery and tick borne encephalitis tend to increase (Burmaajav. B., 2010). <p>Also climate change could have an impact on human health and injury by natural disasters, food safety and water sanitation. In addition, the outbreak of some tropical diseases may occur in Mongolia. For instance, researchers have confirmed that the virus of the Western Nile has been found in Khovd and Gobi-Altai aimags. Also, cholera occurred for the first time in Mongolia in 1996. Human deaths caused by forest acarus, which did not exist in Mongolia previously, have been recorded in the past few years (SNC Mongolia, 2010).</p>

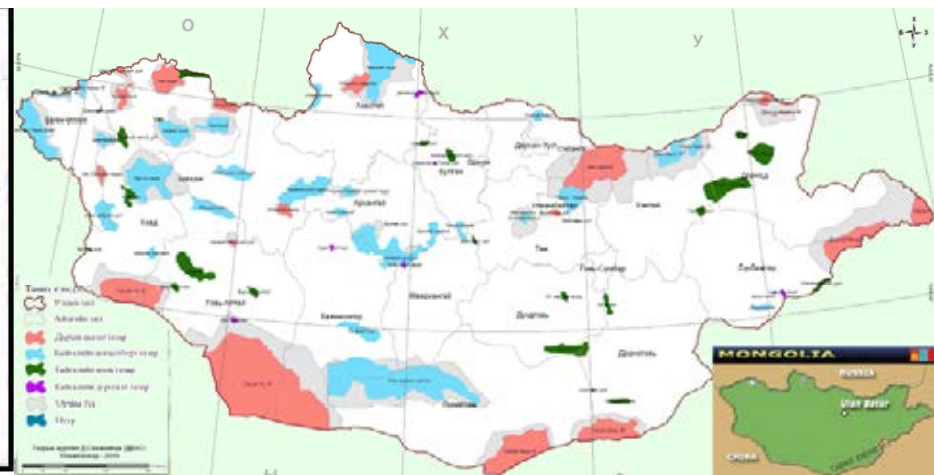
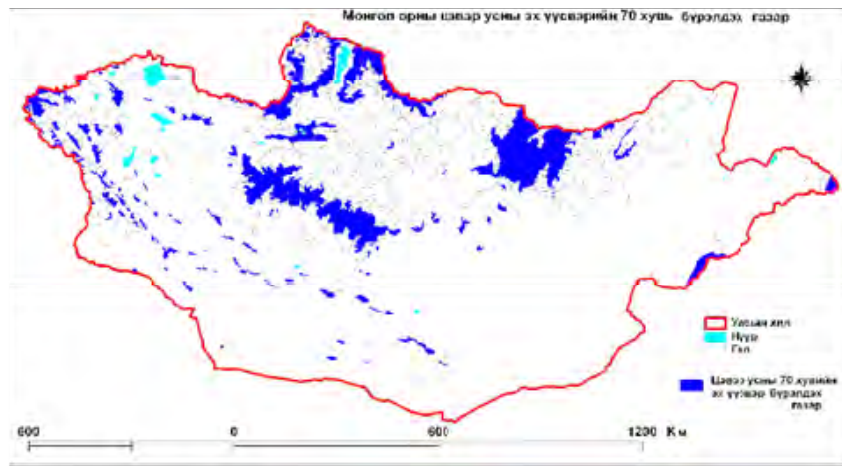
Adaptation measures

1. Development and implementation of Integrated River Basin Management policy and plans in a basin at national level



2. Maintaining availability of water resources through protection of runoff formation zones and their native ecosystem in river basins (currently 17%, goal is 30%)

- Implementation of ecosystem based adaptation technologies
- Supporting ecosystem services and construction of water diversion canals from rivers to drying lakes, located in flood plains and re-forestation



3. Construction of reservoirs for glacier melt water harvesting



4. Enhancing hydrological monitoring, research and building up early warning system for hydrometeorological disasters. Intensification of environment monitoring (extension and modernization of observational network, modeling, remote sensing, data integration and regional cooperation and etc.)

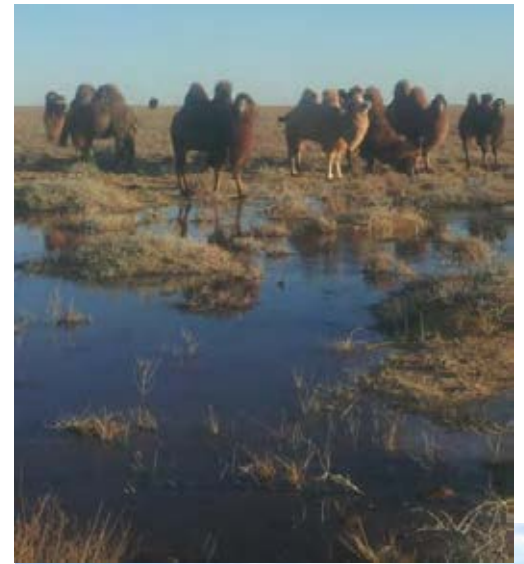
5. To construct water reservoirs and water diversion facilities to transfer water resource to dry regions (from North to South). There are several projects and project proposals on construction of water reservoirs and water diversion from North to South.

6. To introduce water saving and water treatment technologies (grey water use, water reuse and water metering, advancing the level of water purification and sewage water treatment plants)

7. To adapt water storage policy in the upper river basins of the Khangay, Khentey and Khovsgol Mts. to regulate long-term river regime and to minimize water surface evaporation loss from reservoirs and irrigation systems. *Closed water distribution and storing systems* are appropriate to be implemented in the steppe, semidesert and desert regions.
8. The minimizing soil and water pollution sources are the basis for water resources protection.
9. Increase in frequency of occurrence of droughts forces an application of irrigation systems for sustainable crop production. Currently used irrigation technologies are highly recommended to replace with advanced efficient technologies as drop-irrigation and etc.
10. Implementation of projects towards to reduction of GHG emissions, use of Clean Development mechanisms and economically efficient use of weather modification are important for reducing negative impacts of climate changes.



Thank you



Hydro-geology Mapping and Groundwater Resources Development In Arid Environment of Mongolia



Geology survey center
N. Jadambaa, B.Nyamaa
L.Munkhtuaya,
B.Uuganhuu



Introduction

1. Water security of Mongolia for the most part is depended from groundwater resources location. Hydro-geological study in arid environment of Mongolia is carried out in 3 main stages: 1).Hydro-geological mapping; 2). Groundwater resources prospecting and exploring; 3) GW exploiting technic, technology-well construction, pump station, water-pipe,

- **24th IHP-Regional Steering Committee Meeting;**

Four (4) Objectives:

2. Showcasing state of the art research and application of research in the field of water security in arid environment

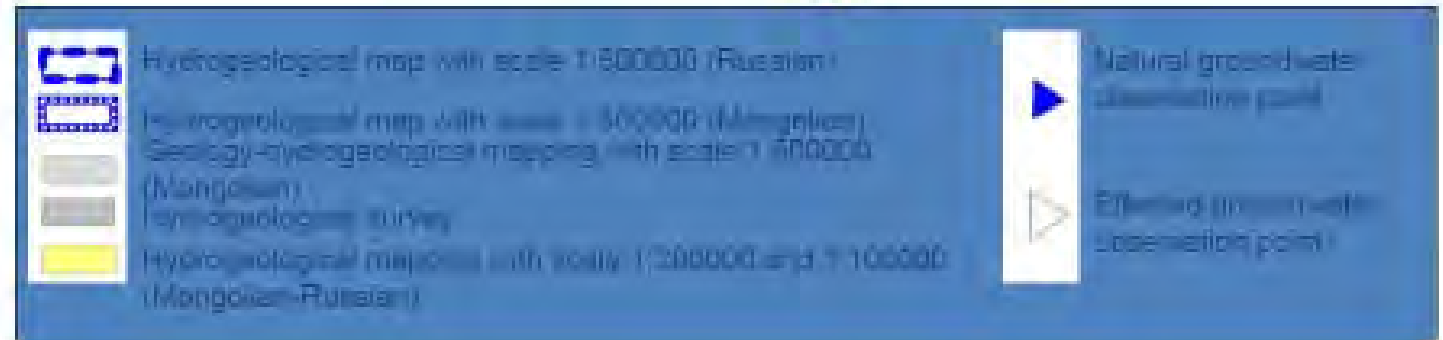
1, 3, 4 objectives

1. Hydro-geological Mapping

1.1) Regional hydro-geological survey and mapping; Published hydro-geological maps: Hydro-geological map of MPR at scale 1:1500 000 [1973] and Hydro-geological map of Mongolia 1:1000 000 [1996] and at scale 1:3 000 000, not published map 1:500 000 and 1:200 000 for choosing territory of Mongolia[1981-1997], and also new hydrogeological map at scale 1:500 000 for all territory of Mongolia (2014-2017)

- complex geological-hydro-geological survey at scale 1:500 000 on the area 340 000 km²
- hydro-geological survey at scale 1:100 000 - 1:200 000 on the some desert area of the country - 210946 km²
- hydro-geological survey at scale 1:10 000-1:25 000 on near territory of ore-bearing or coal-bearing areas and Ulaanbaatar area 6000 km²

Regional hydro-geological mapping

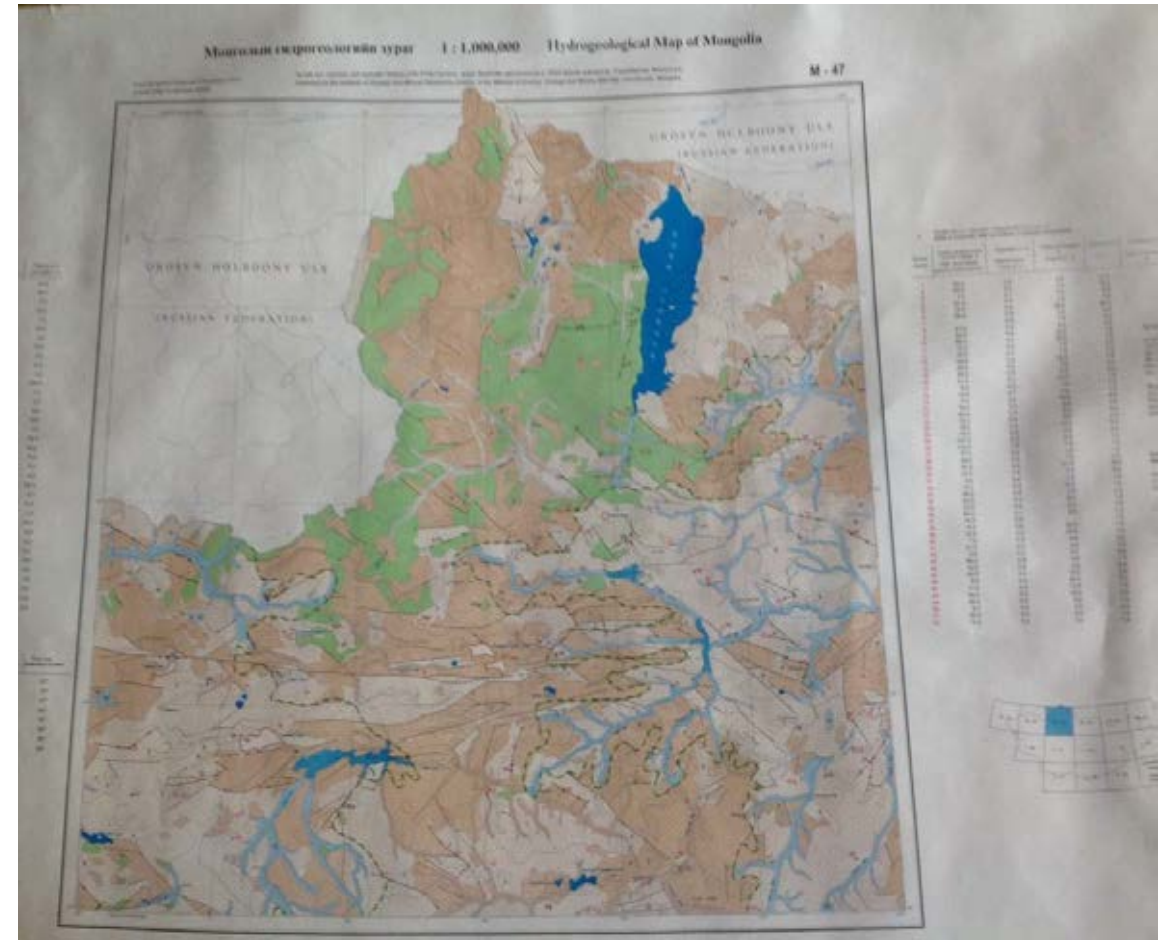
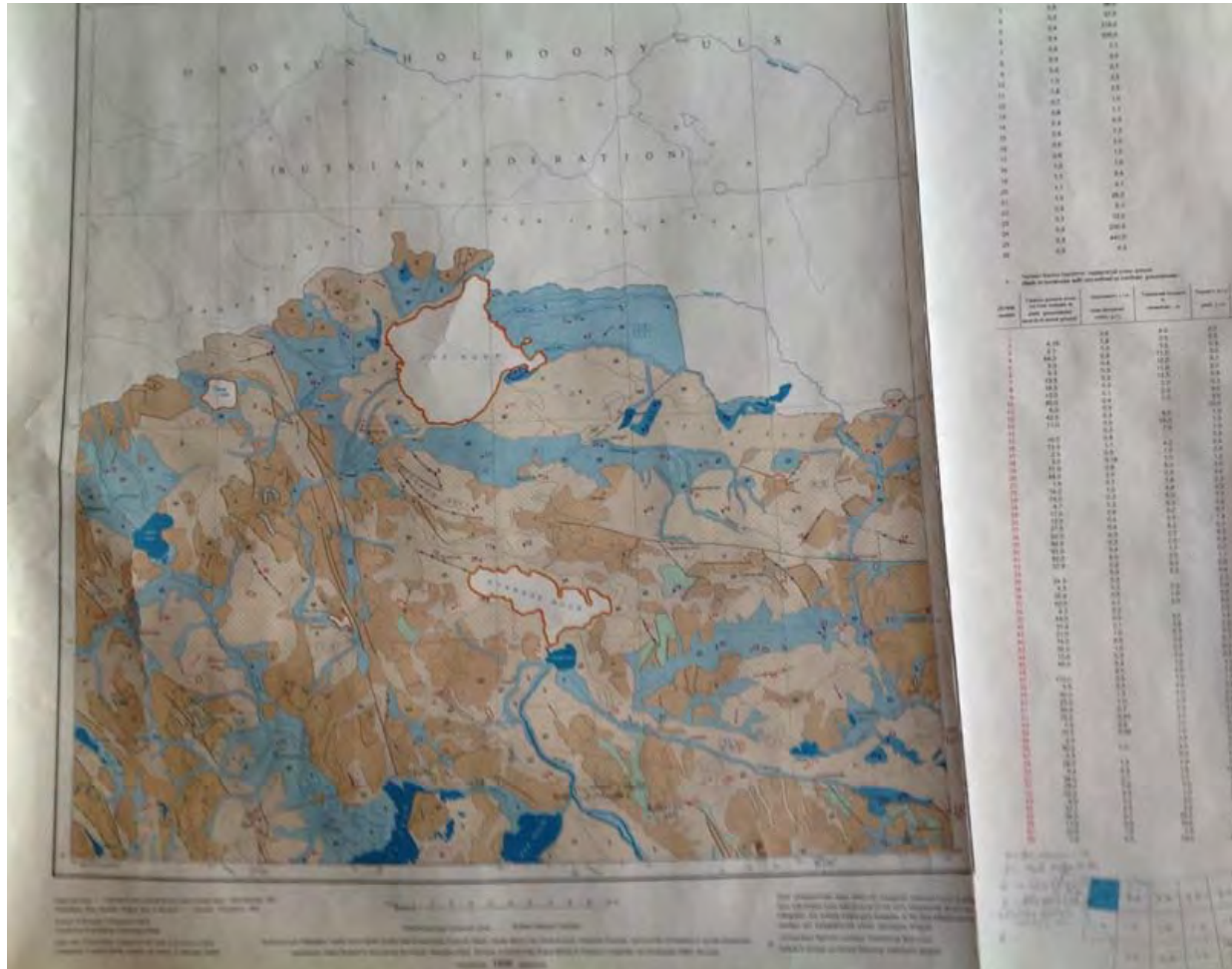


Hydro-geological Map of MPR, scale 1:1 500 000, 1973, Moscow

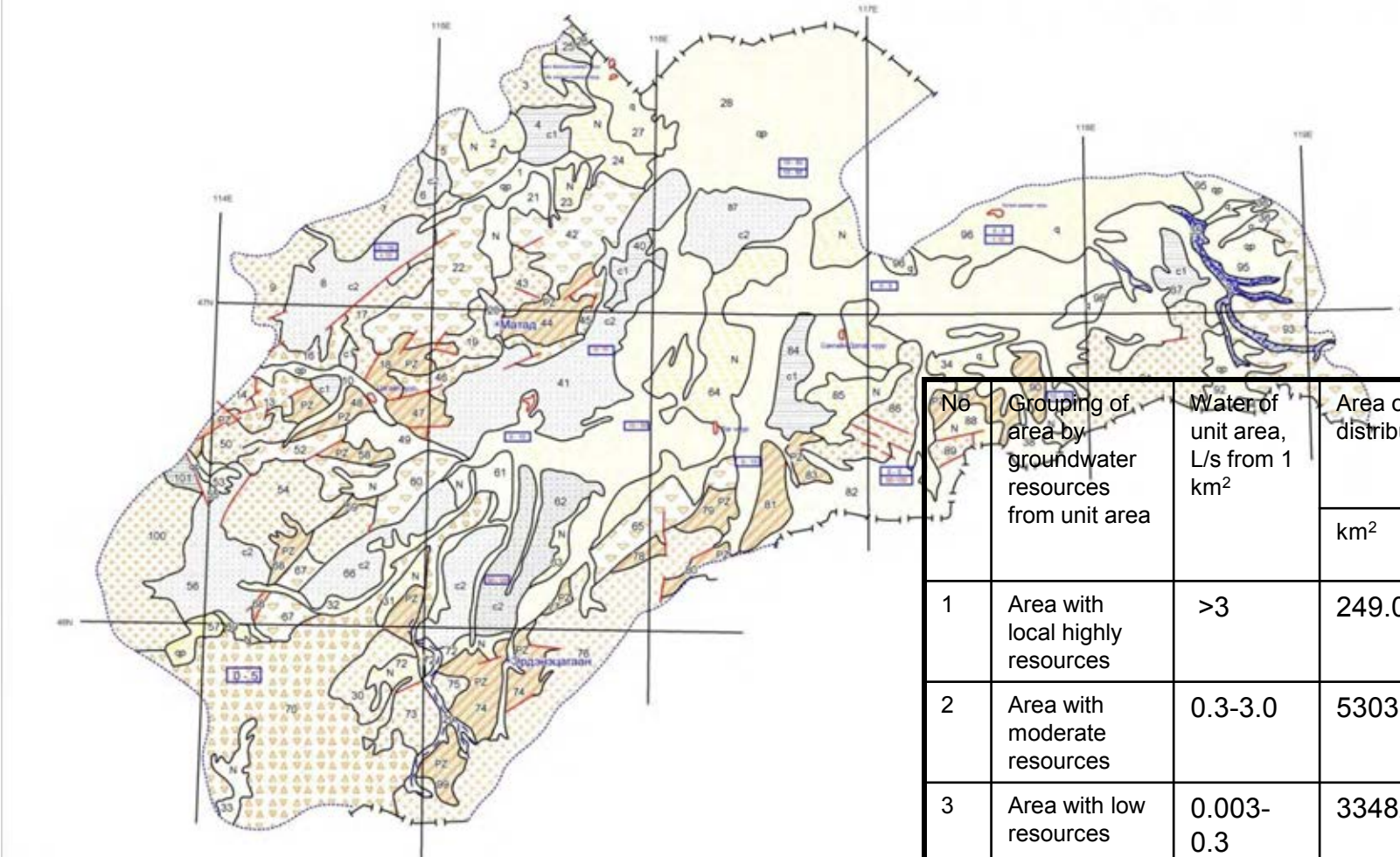


Hydro-geological Map of Mongolia at Scale 1:1 000 000, by 15 sheets, including separately legend on the one sheet, 1996, Hannover-UB

Sheet:M-46 and M-47



МЭНЭНГИЙН АЙ САВЫН ГАЗРЫН ДООРХИ УСНЫ НӨӨЦ БАЯЛГИЙН ЗУРАГ
М. 1:1000000



No	Grouping of area by groundwater resources from unit area	Water of unit area, L/s from 1 km ²	Area of distribution	Ground water resources
			km ²	10 ⁶ m ³ /year
1	Area with local highly resources	>3	249.0	23.56
2	Area with moderate resources	0.3-3.0	5303.0	275.94
3	Area with low resources	0.003-0.3	33482.8	47.91
5	Area from low resources to no groundwater	<0.003	25989.7	2.6
	Total		65024.5	350.01

Groundwater resource of Menen basin

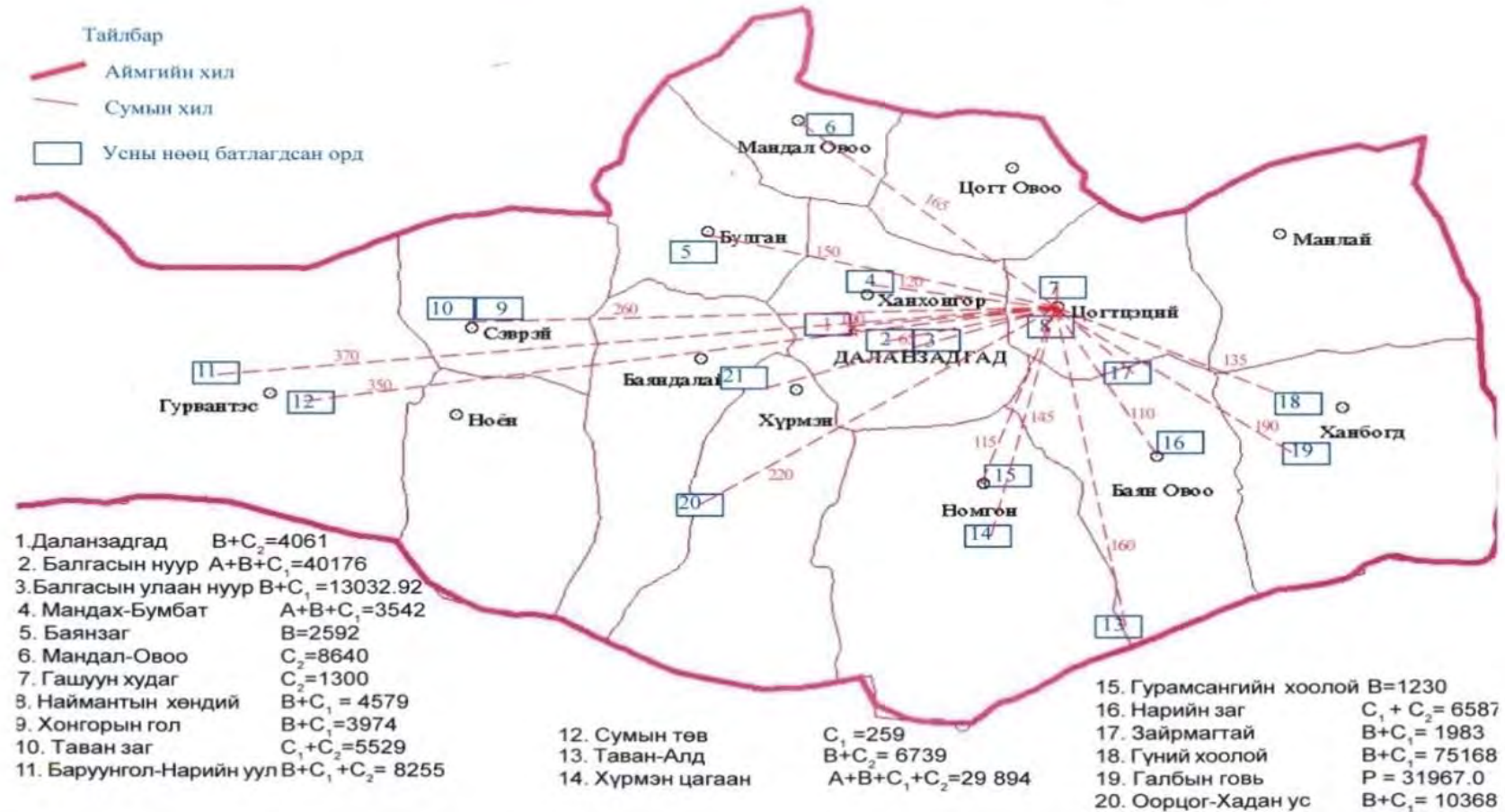
2. Groundwater Resources Development in Mongolia, including arid desert area

- 2.1) Hydro-geological, geophysical prospecting and drilling for discover of sources for water supply of animal husbandry and agriculture . 40000 productive wells were drilled and constructed
- 2.2) Exploration investigation for a groundwater sources for water supply of population and industrial centers and agriculture. More than 240-260 groundwater resources development deposits were prospected or explored.
- 2.3) Investigation for dewatering of mineral resources deposits, including in arid desert area: copper deposit- Oyu tolgoi, Tsagaan Suvarga, fluorite (CaF₂) deposit: Bor Undur, Urgun, Zuun tsagaan del, Hongor, Burjgar and other; all coal minings - Shivee ovoo, Nariin Suhait, Tavan tolgoi and other.
- 2.4) Mineral water exploration. 5 hot mineral water deposits, 6-7 cold mineral water deposits were explored.

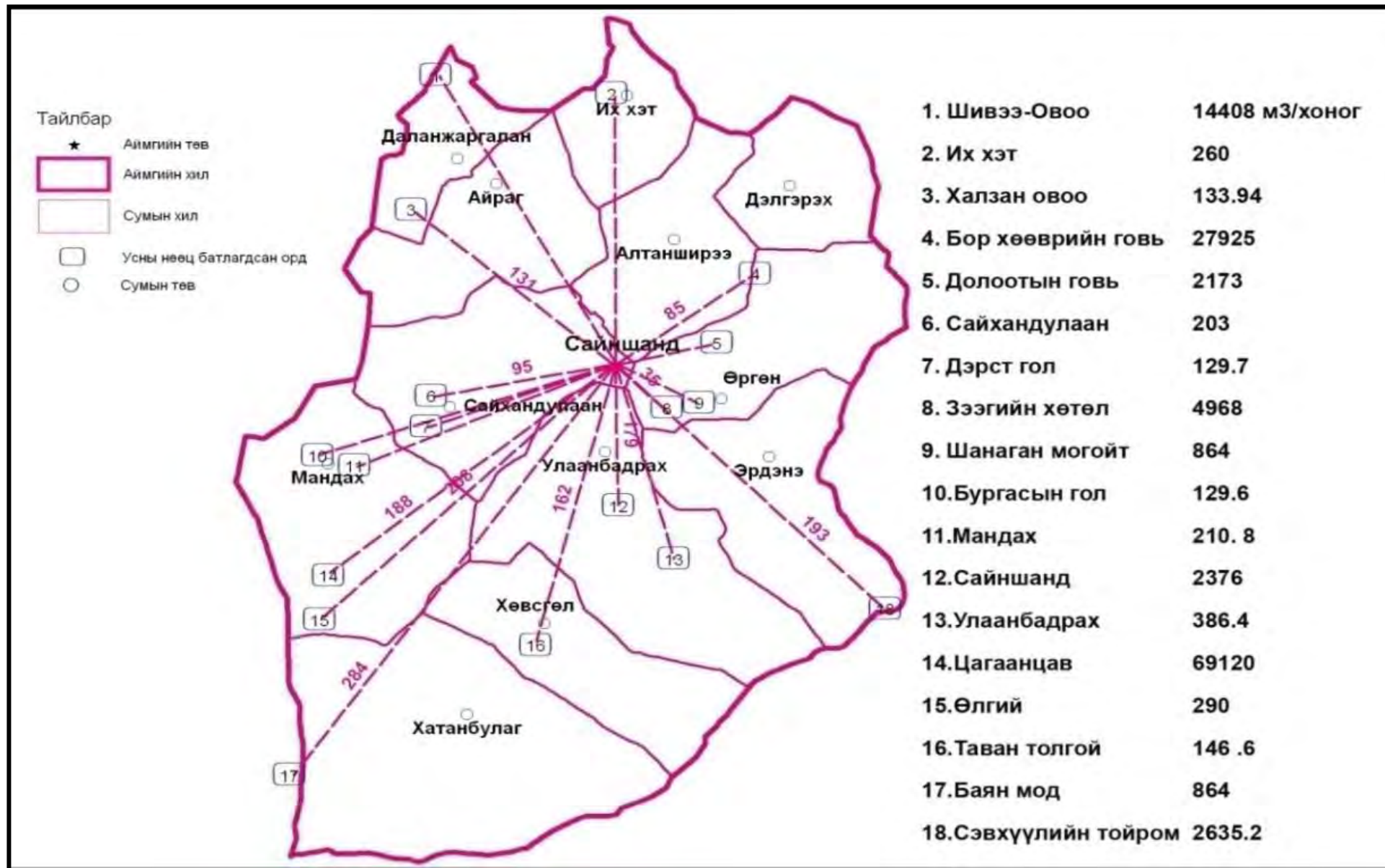
Groundwater Resources Developed and Main productive aquifers for urban centers:

- Inter-granular alluvial aquifers (For centralized water supply Ulaanbaatar, Darhan, Erdenet and other 11 aimag centers),
- Inter-granular alluvial-proluvial aquifers, Permian, Devonian geological ages formation fissured aquifers (Ulaangom, Bulgan, Dalanzadgad),
- Neogene, Cretaceous inter-granular aquifers and other geological ages aquifers (Baruun Urt, Mandalgobi, Sainshand),
- Pre-Cambrian metamorphic gneiss and limestone-fissured aquifer (Altay)

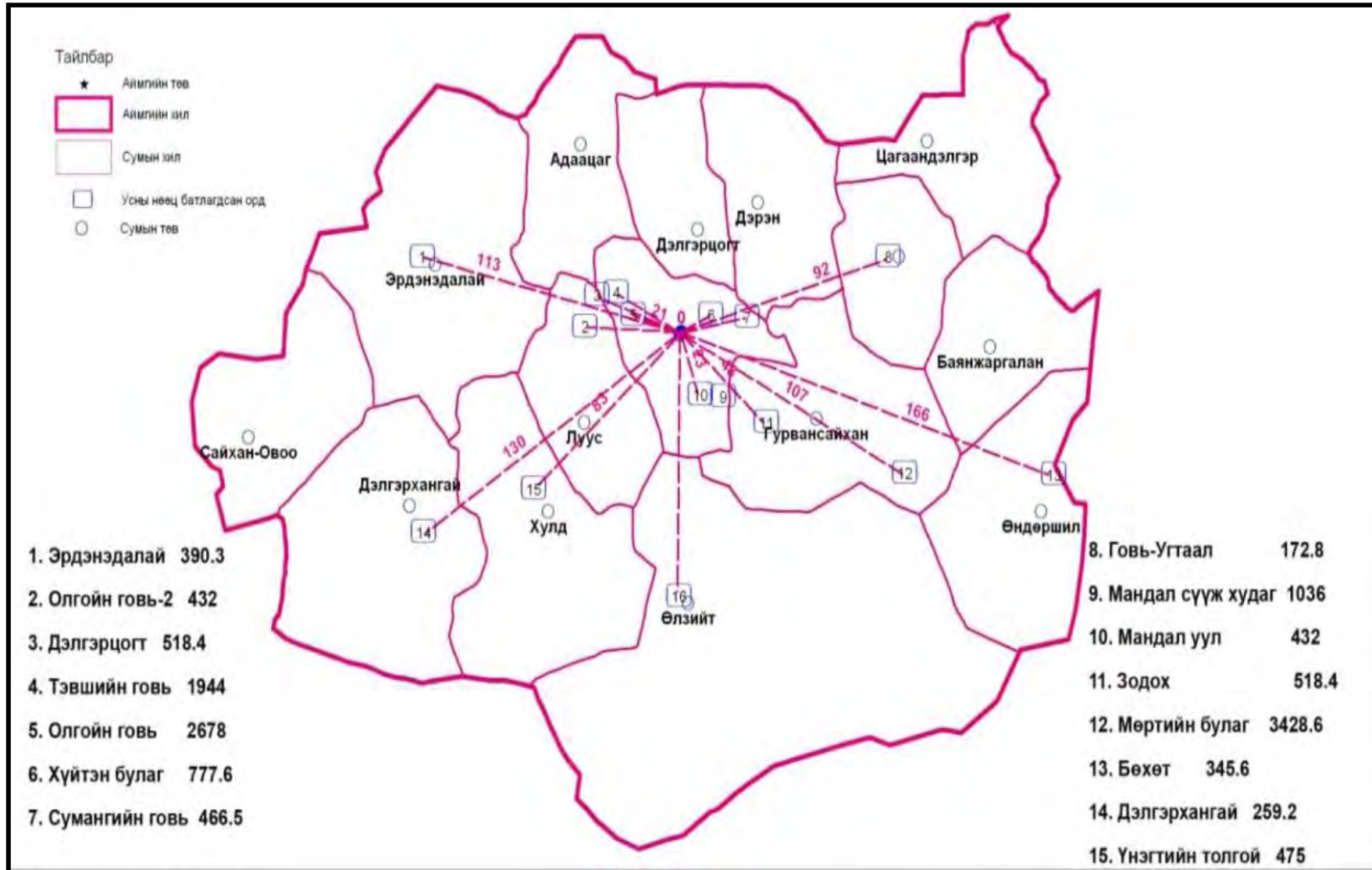
GW deposit location map in Southern Gobi aimag (source: Geo information center)



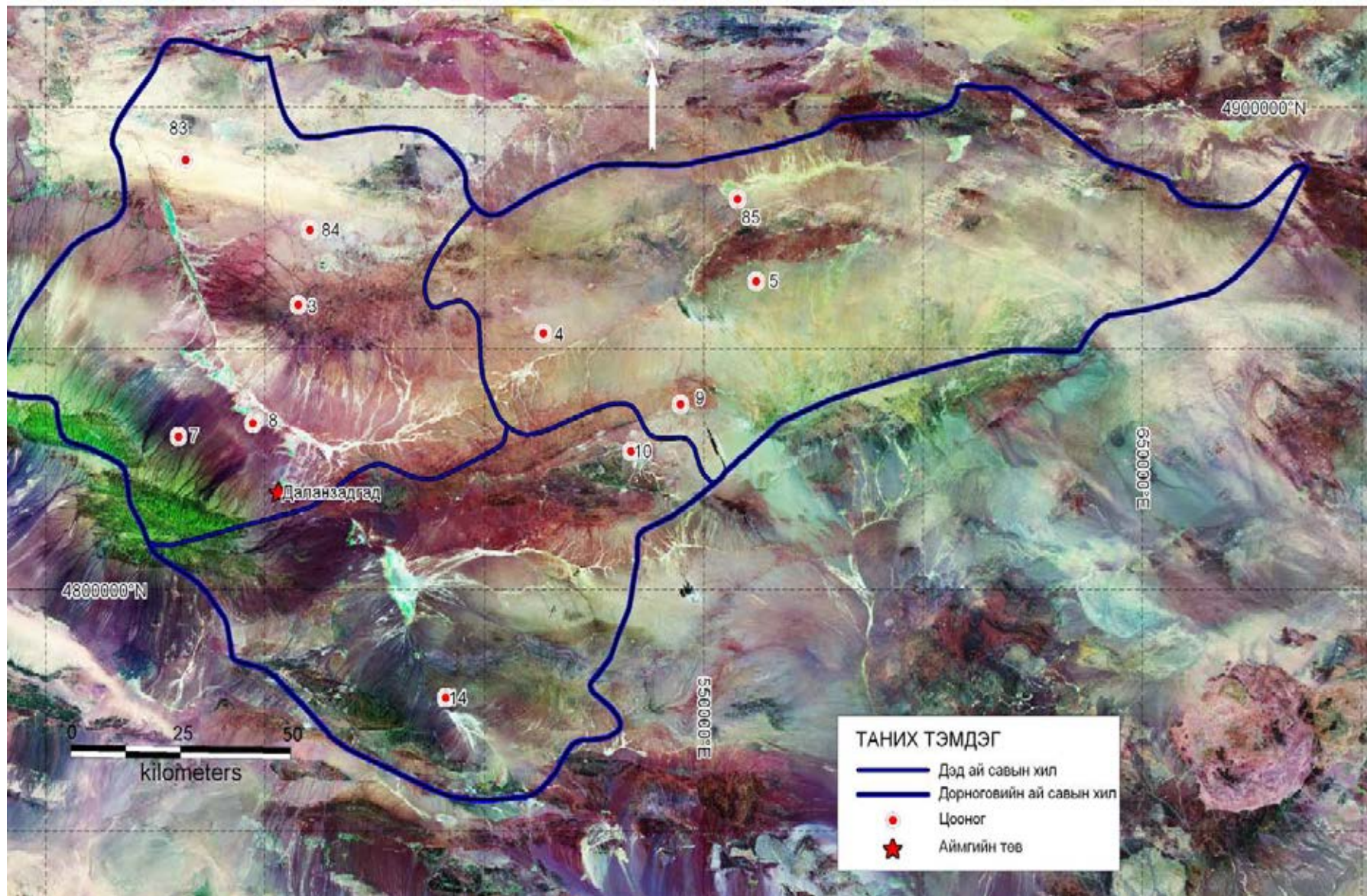
GW deposit location map in East Gobi aimag (source: Geo information center)



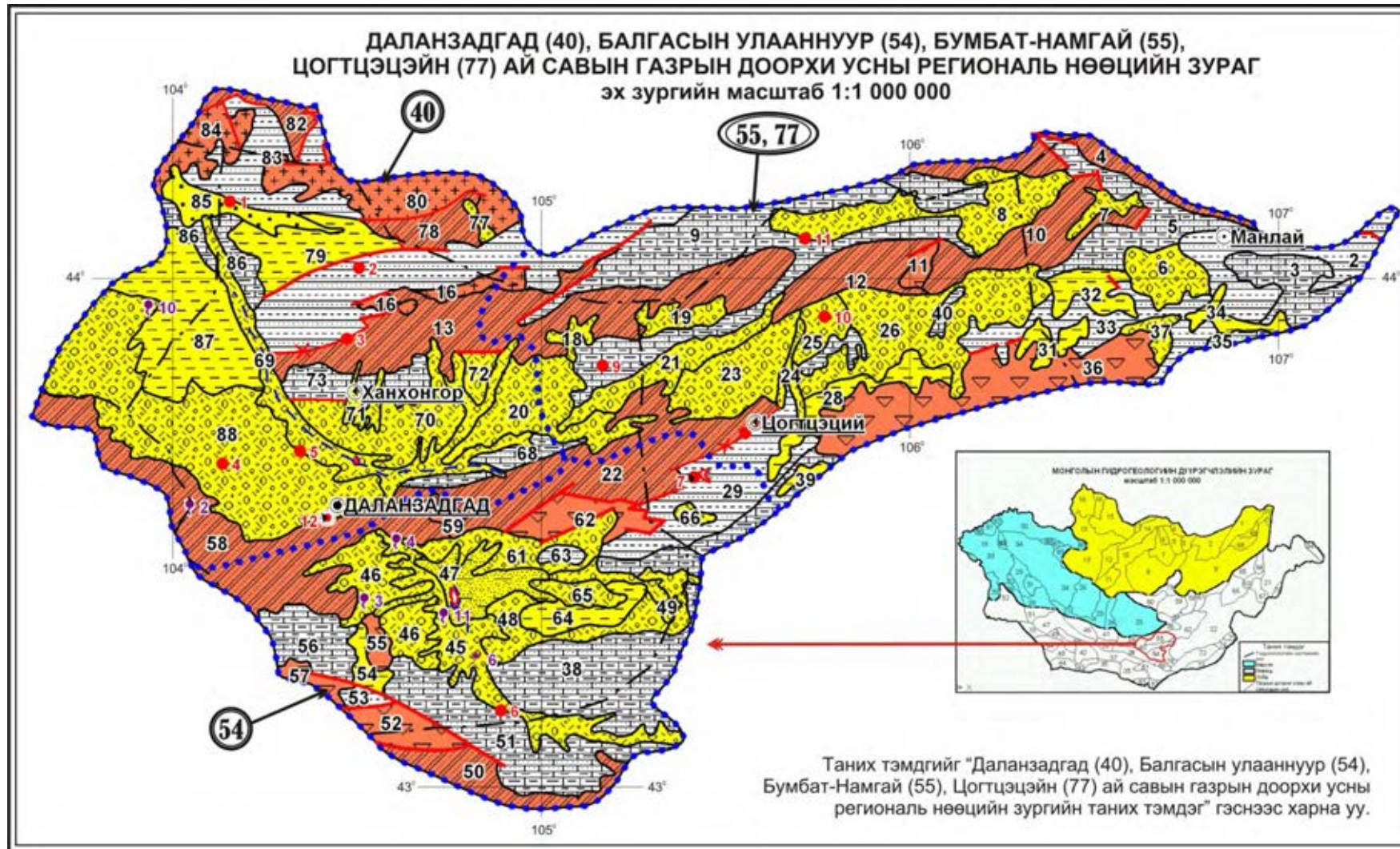
GW deposit location map in Middle Gobi aimag (source: Geo information center)



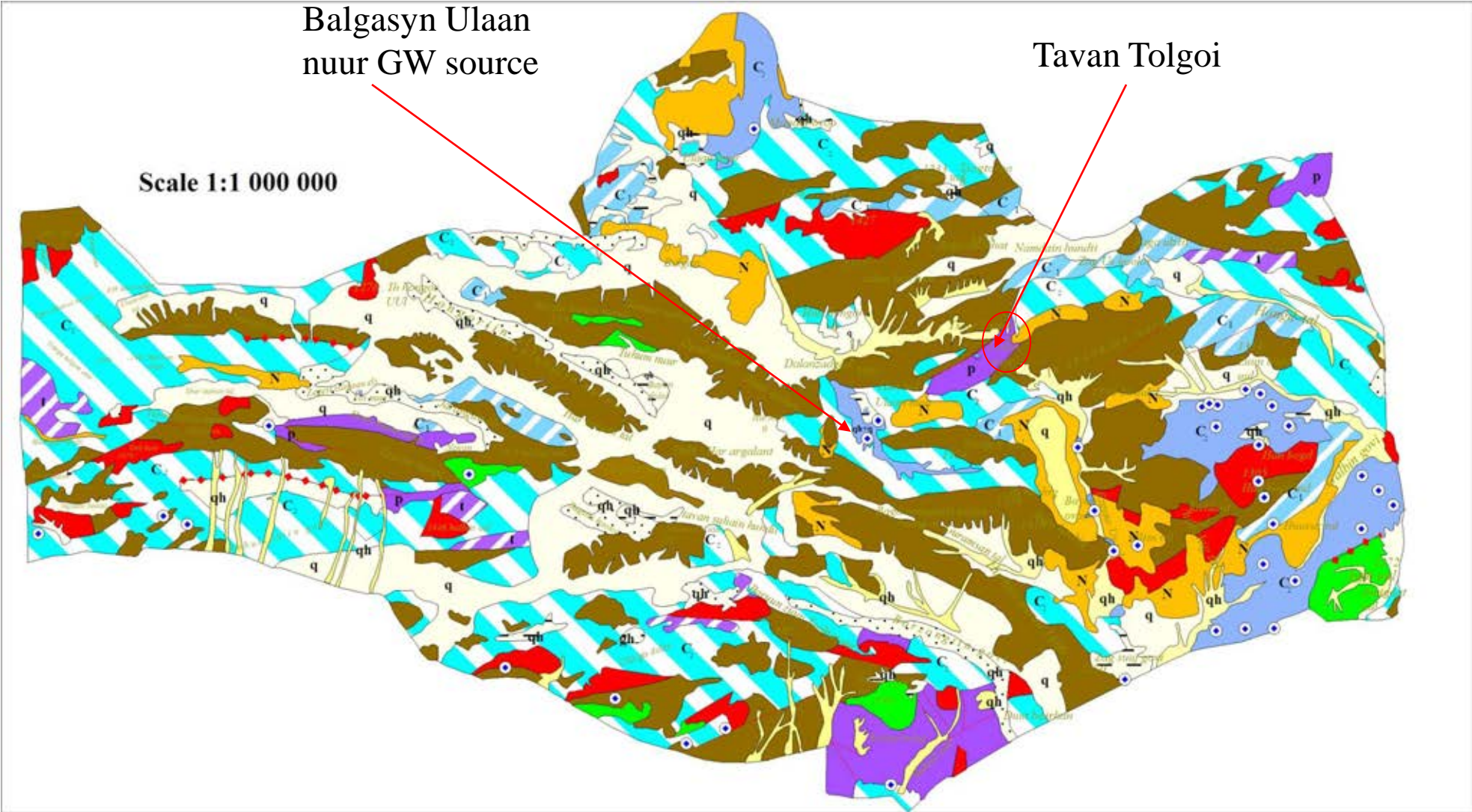
Water basin Dalanzadgad, Balgas ulaan nuur and TsogtTsetsei-Naimdai

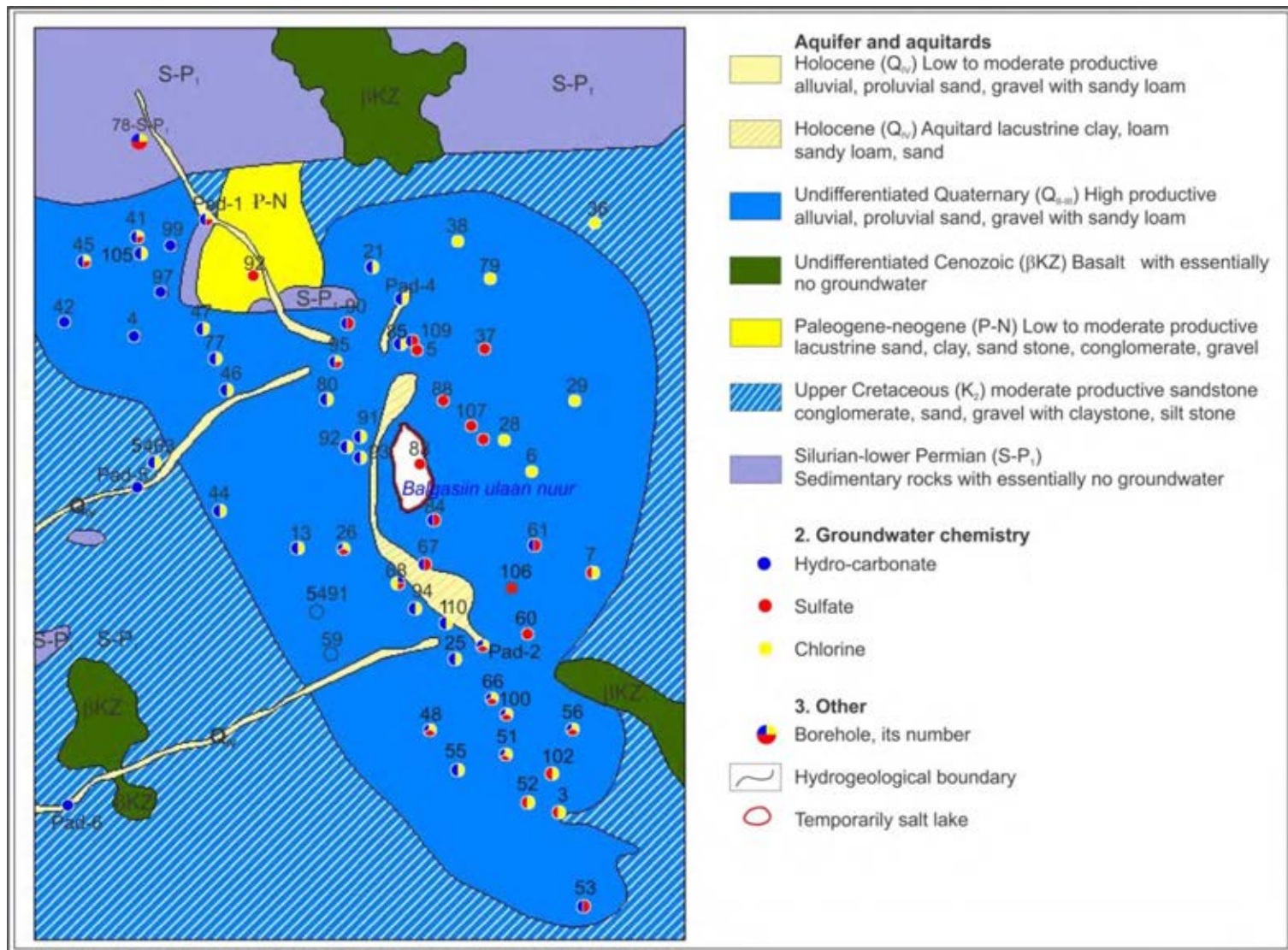


Groundwater Regional Resources Map of basins: Dalanzadgad, Balgas ulaan nuur and TsogtTsetsei-Naimdai



Hydrogeological map of Umnugobi aimag territory





Groundwater deposit Balgas Ulaan nuur , Location of exploration boreholes

Recent and future water supplies for Tavan Tolgoi coal mine

Balgasyn Ulaan Nuur is one of important groundwater source for Tavan Tolgoi coking coal deposit. Groundwater source of Balgasyn Ulaan Nuur was investigated in 1981-1984 and evaluated potential exploitation source as 40.2 thousand m³/day. Groundwater resource with mixed composition is accumulated in Quaternary unconsolidated deposit, overlying Cretaceous sedimentary rocks, composed of layered different types of gravel filled by clay loam, sand. Thickness of water bearing formation ranges from 1.0m to 123.0m and thickness gives high water storage is 15.9-49.3m. Some data of hydrogeological wells, which drilled during groundwater exploration of Balgasyn Ulaan Nuur, is given in table and well location in figure.

GW deposit “Balgas ulaan nuur”. Comparison of results pumping tests in 1984-1987 and 2007-2008

Well N in 2007-2008	Yield in 2007-2008, l/s	Well N in 1984-1987	Yield in 1984-1987, l/s	Well N in 2007-2008	Yield in 2007-2008, l/s	Well N in 1984-1987	Yield in 1984-1987, l/s
80A	40.49	80	11.1	66A	29.9	66	60.0
93A	15.21	93	22.2	85A	10.05	85	11.1
26A	15.15	26	20	60A	15.03	60	11.1
68A	15.03	68	14.3	106A	15.07	106	12.5
110A	20.12	110	20	61A	15.08	61	27.7
96A	15.16	96	5.9	107A	15.05	107	21.3
25A	15.03	25	14.0	109A	15.02	109	12.5
Дүн	136.19		107.5	НИЙТ ДҮН	251.39		263.7

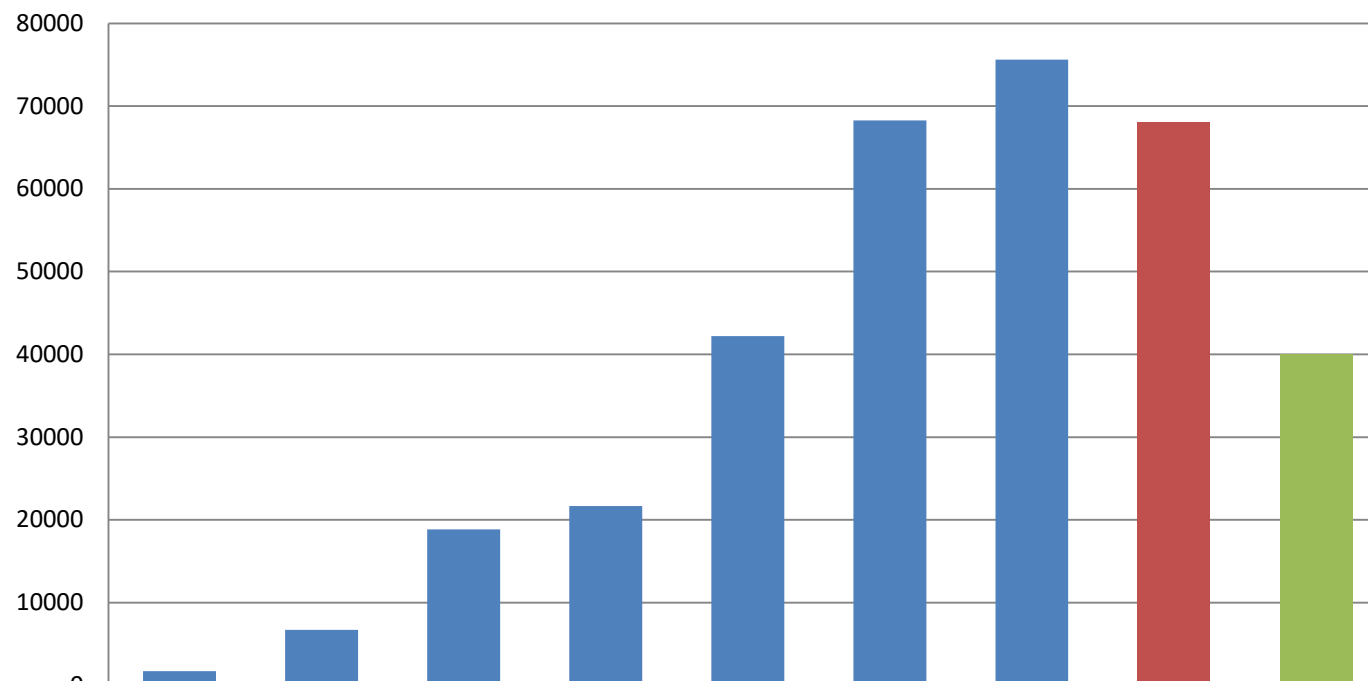
Location of GW wells in “Naimant” area, are used for water supply Uhaa hudag mining





**Төвийн хэсгийн Таван толгойн нүүрсний бүлэг ордын усан хангамжид, газрын доорхи
усны ордоос ашиглах боломжит
нөөцийн харьцаа**

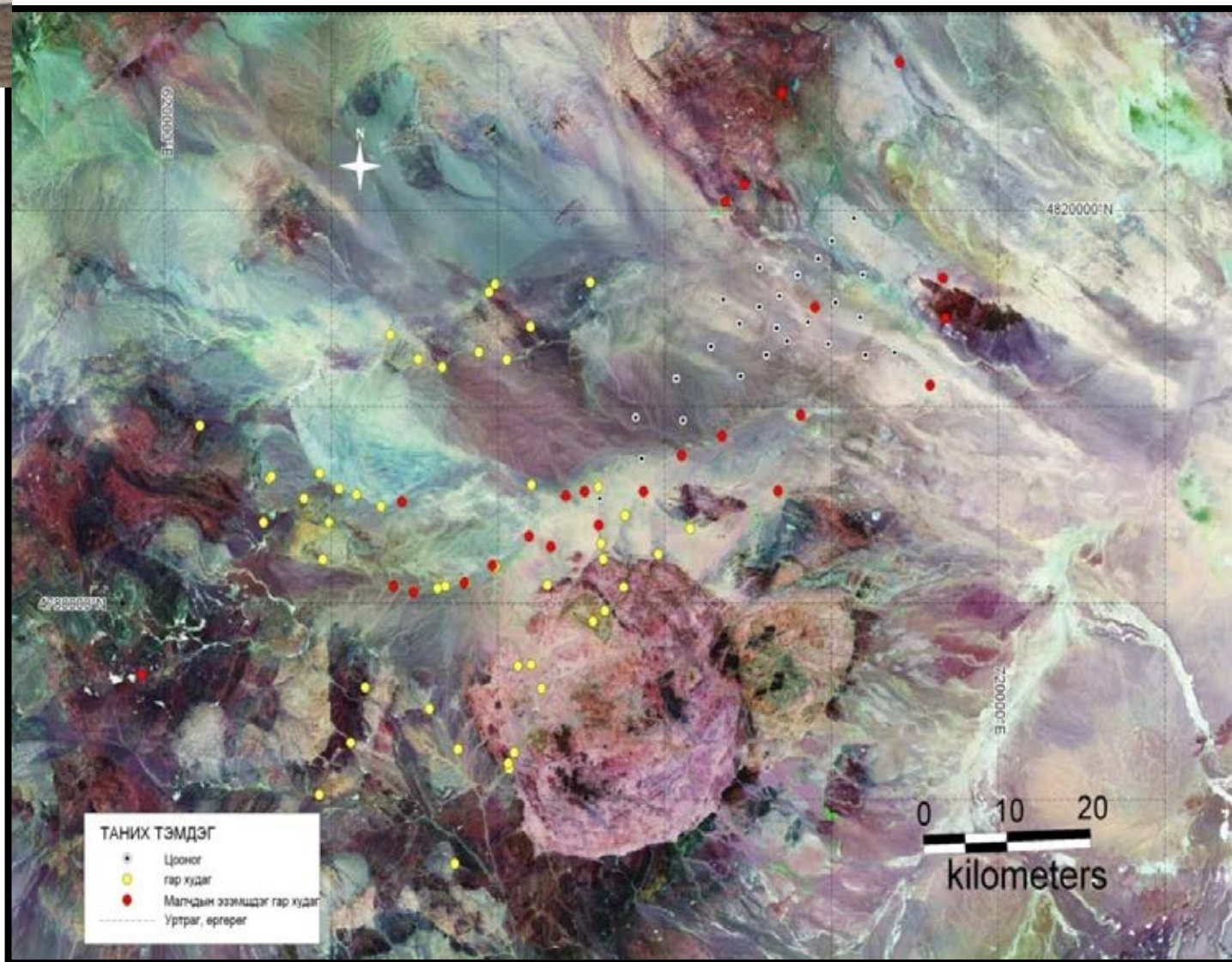
Ашиглагдаж буй усны хэмжээ м3/хон



■ Экологийн үүднээс зөвшөөрөгдөх нөөц									40000
■ Ашиглах боломжит нөөц								67996.8	
■ Ус хэрэглээний төлөв	1693	6704.2	18846.2	21671	42191	68268	75605		

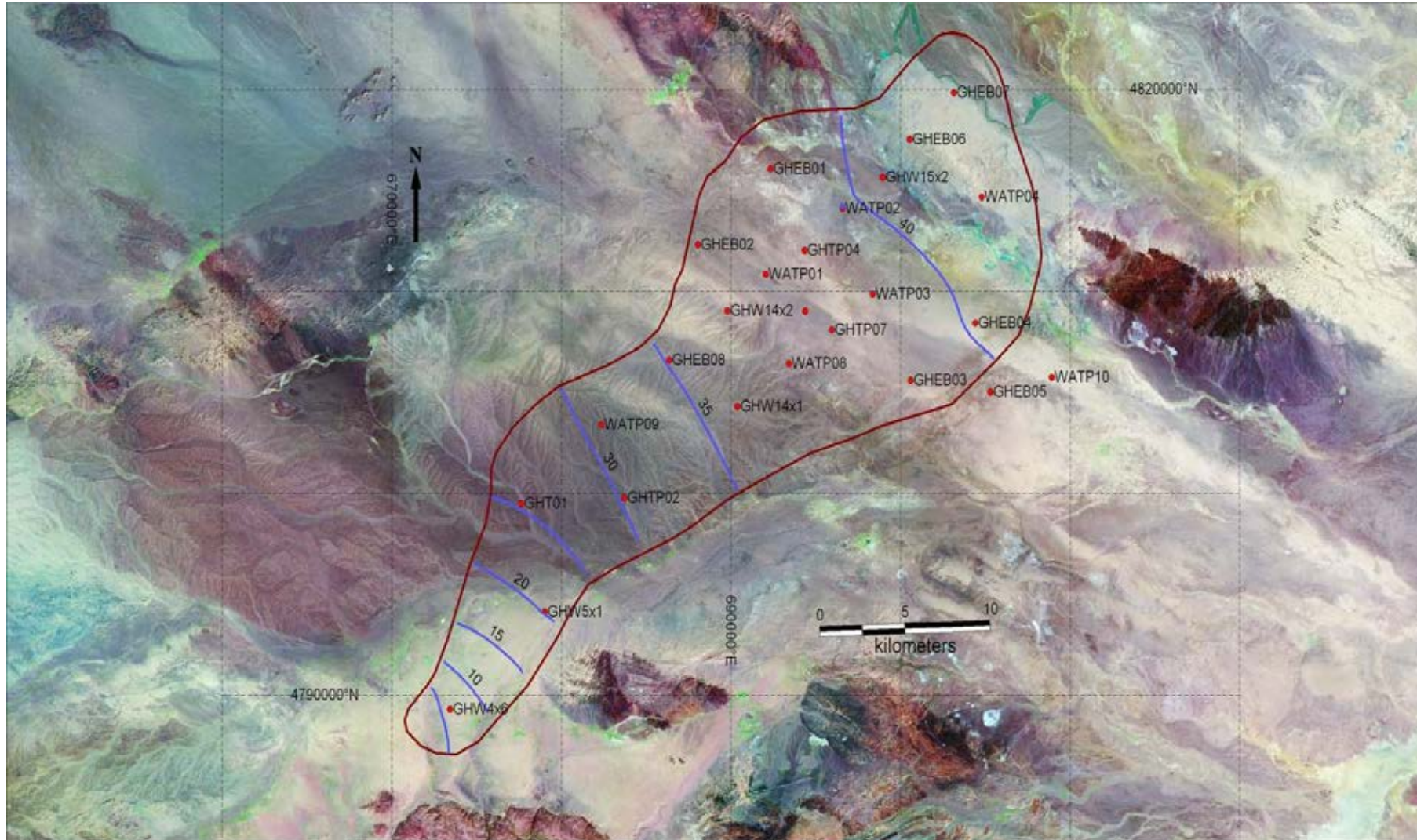
Oyu Tolgoi water supply

- Geological exploration camp of Oyu Tolgoi is supplying with water from 6-8 wells which investigated by their exploration and Aquaterra Limited. Aquaterra Limited is carried out geophysical and hydrogeological investigation by investment of Ivanhoe Mines Mongolia, identified potential groundwater resource in the Galbyn Gobi and Gunii Hooloi and evaluated groundwater exploitation resource will be able to meet water demand for processing plant. For example, groundwater resource that is identified in Gunii Hooloi area is 6 millions of cubic meter. “GUNII HOOLOI GROUNDWATER EXPLORATION PROGRAMME” report noted that “A substantial aquifer system exists, with a saturated aquifer storage of 120,000 Mm³, and a total groundwater availability of 6,000 Mm³” and given by table.

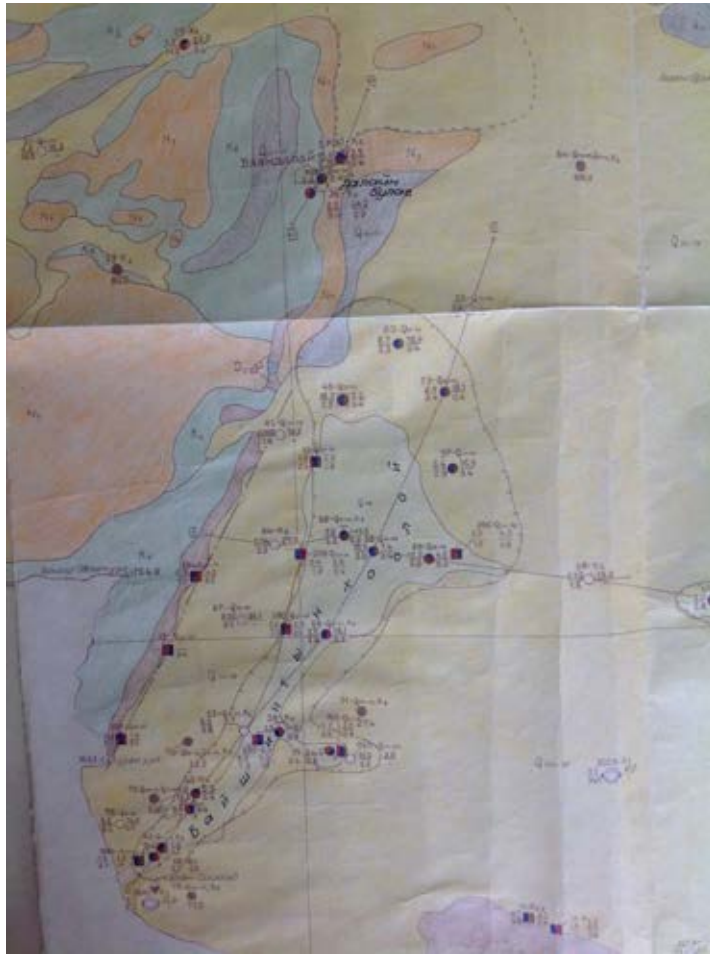




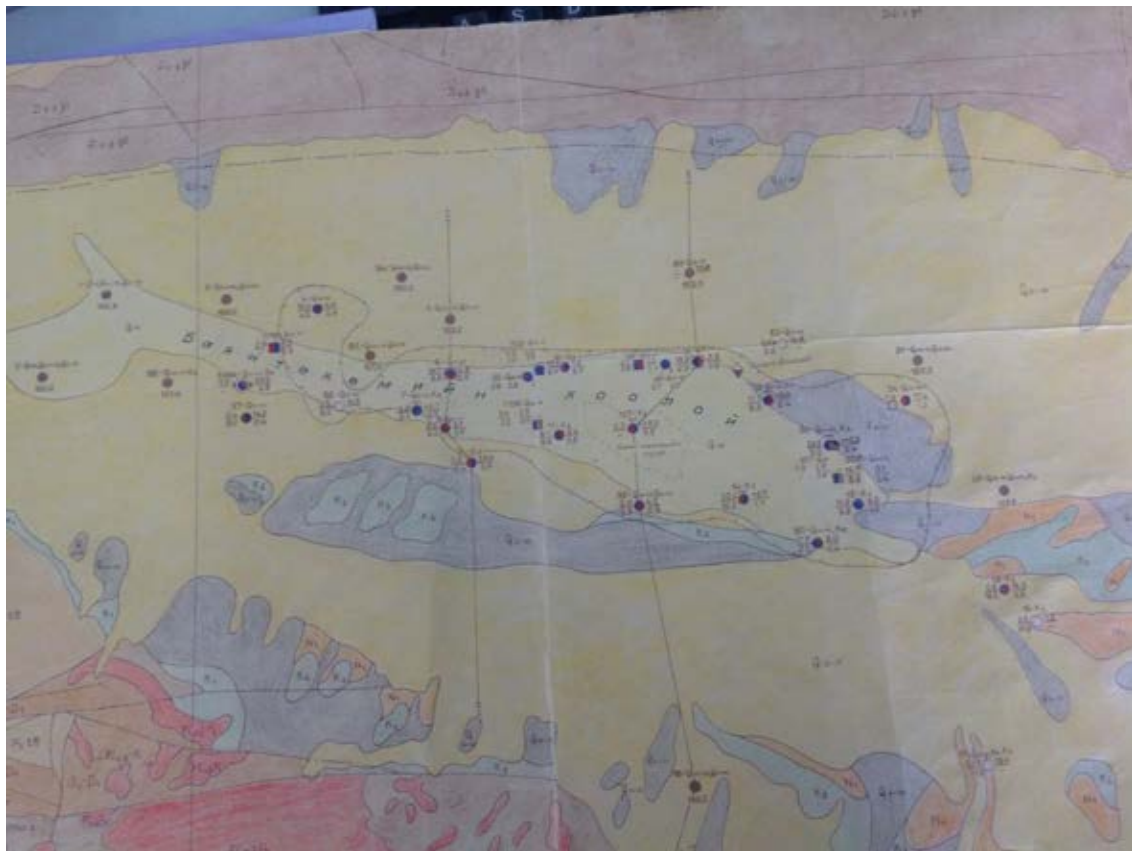
**GUNII HOOLOI GROUNDWATER RESOURCES DEPOSIT. PREDICTIVE DRAWDOWN MAP. AFTER 5 YEARS OF EXPLOITING
DRAWDOWN -40- 50 M IN SEVERAL WELLS**



Groundwater resources Development for livestock and agriculture



Groundwater resources Development for livestock and agriculture



Groundwater exploiting old and new wells, Groundwater resources development artesian flow boreholes



Reconstruction, Protection of old wells, artesian flow boreholes, monitoring on the water supply sources of aimag centers



Mineral water resources: TSAGAAN SUM and HUJIRT mineral water spring



Eastern Mongolia, Artesian flow



Artificial recharge by groundwater resources into surface water resources



Conclusion and Proposal

- GW Renewable resources of Mongolia are limited. Consequently, main part of GW Exploitable Resources and GW reserves are fossil and vulnerable.
- It is necessary new Methodical instruction (or standard) for study, approbation, registration and ... A,B,C1 , JORC....
- This presentation about results and an achievements in hydro-geological mapping and GW resources development
- To reach: foreign countries friendly personnel and financial supports were decisive force: Russia, China, Germany, Japan, Australia, Korea, USA and others
- Monograph with joint authors and editors from UNESCO and Mongolia, to end of 2019: Hydro-geological Mapping and Groundwater resources, Mongolia

Thank you, Bayarlalaa



The international and national water dialogue on the delivery of SDG 6 “Ensure availability and sustainable management of water and sanitation for all” in Mongolia and wider Asia and the Pacific region, 25 October 2016, Ulaanbaatar, Mongolia

WATER SUPPLY MANAGEMENT: CHALLENGES AND PRIORITIES

JANCHIVDORJ. L

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CONTENT

- **Natural condition**
- **Social condition**
- **Water supply and sanitation**
- **Water security**
- **Water usage**
- **Water management challenges**
- **Conclusion & Discussion**



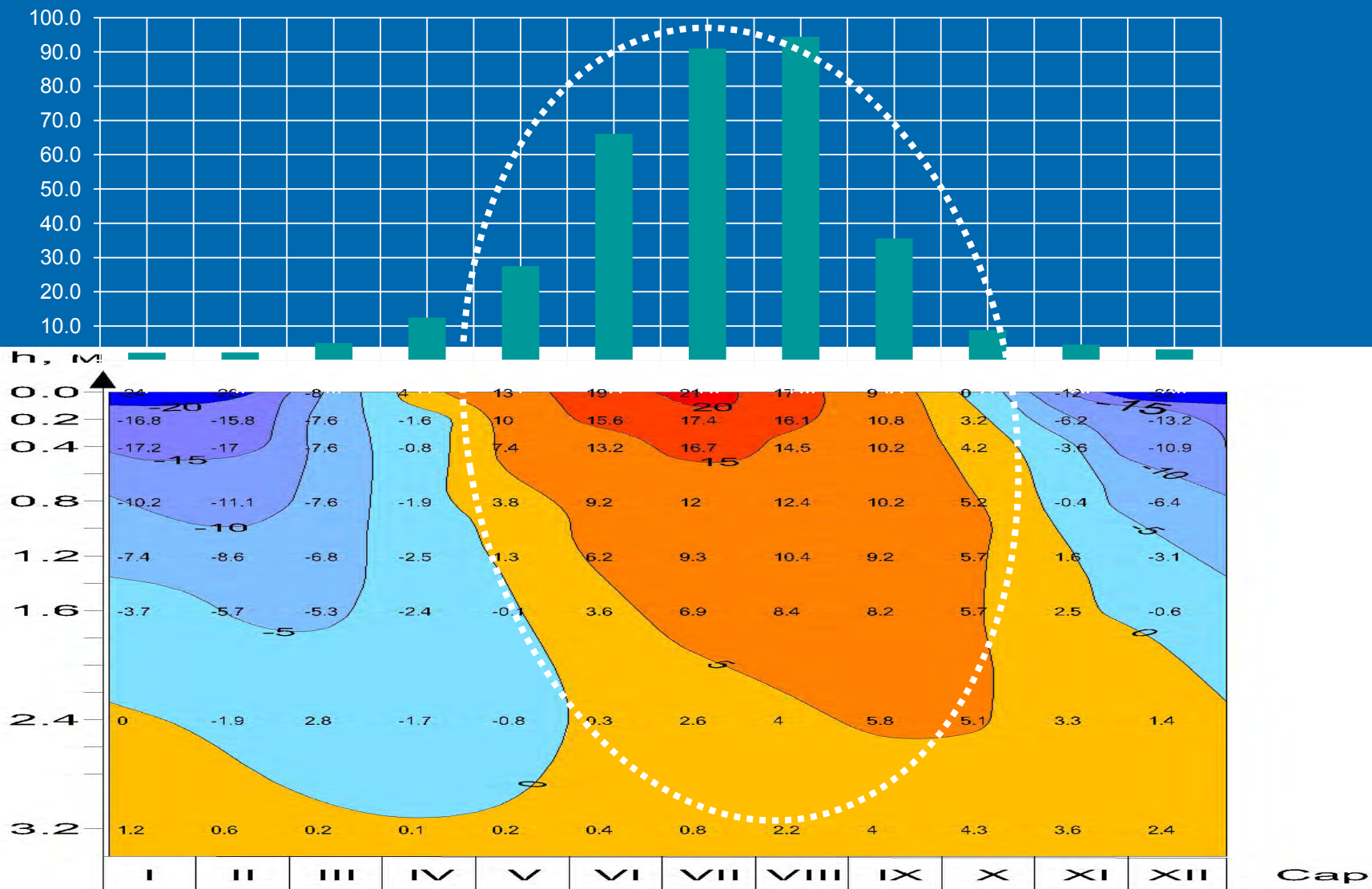
Natural condition

- **Water is the strategic resource for Mongolia. The practice of the development case demonstrates that it's purposeless to talk about the sustainable development unless we solve the water supply.**
- Mongolia is situated at the north East Asian highland and the country with the farthest distances to every surrounding ocean. That situation results in a very **strong extreme climate**; hence, annual precipitation amount very low, hot shot summer and very cold winter entirely are characterizing regional climate.
- Depending on the geographic location land cover is frozen to a depth of approximately 3.5 m and rivers are frozen for up to 7 months of the year. Due to Mongolia's heavy reliance on ground water, the population must therefore rely predominantly on groundwater sources for household and drinking supplies, industrial/mining supplies and livestock watering.
- **Due to the mountainous conditions, almost all rain-fed rivers run to the Arctic and Pacific Ocean basin and most of the surface runoff (~65%) flows out of the country, while a small portion flows into the Central Asian Internal Drainage Basin within Mongolia.**



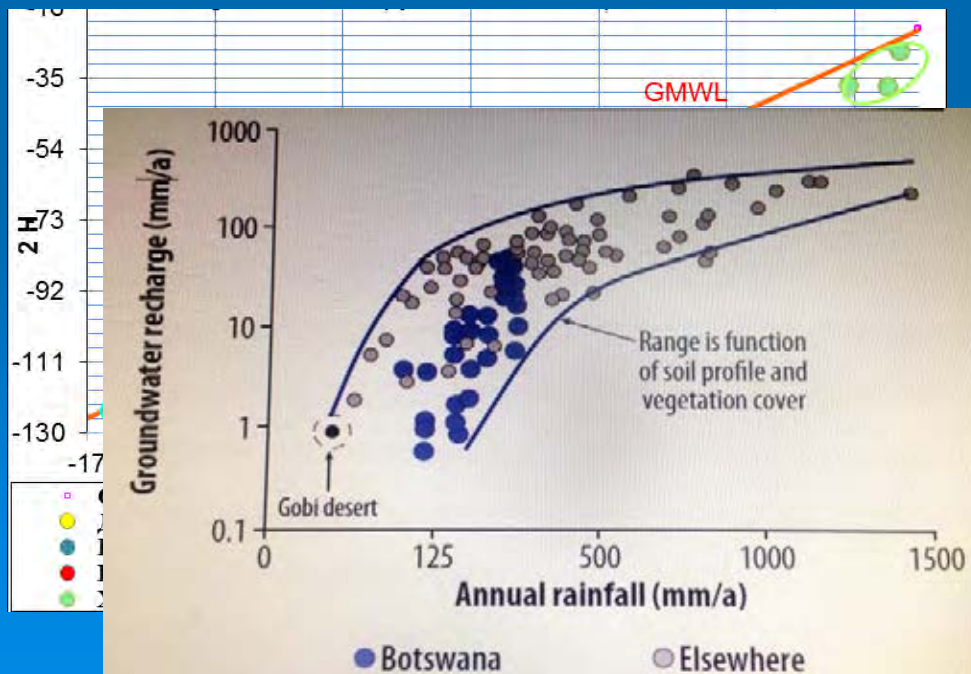
Natural condition, Soil temperature distribution and precipitation

Average by mounts 1988-2009, ON



Natural condition, Fossil water in Gobi Desert

- We found groundwater which has very low recharge in steppe Gobi region of Mongolia depending from the formation and dispersive feature of water resources and it is need to protect the groundwater resources and appropriate use of water resources. The result of survey shown that the groundwater age is 15000-35000 years old which was located in the bigger depression of South Gobi region Mongolia have been used for mining industrial water supply. **The recharge of groundwater is very low 1 mm/a year, and annual precipitation is 38.4-150mm in this region.**
- Gobi area has been limited possibility implementation of world ecological concepts for use of groundwater resources in criteria annual groundwater recharge. There are a world concept for rational use of water ,



Most of the surface runoff (about 65%) **flows out of the country**, while a small portion flows into lakes and basins within the country.

Only 1-10% of the total annual precipitation infiltrates into the soil to replenish aquifers and becomes potentially available as water resource in the form of soil moisture or groundwater

- As a result of 2011, in the ranking list of life level, our country was standing 110th place by human development index, 138th place by health index and 142nd place of environmental quality index from 187 countries.

According to latest statistical book of 2015, about 52.2 per cent of Mongolian population is using poor quality water for drinking.

The government of Mongolia planned to improve the standard of drinking water quality in Soums (administrative unit) centres, but has not implemented MDG on water supply issues.

- **The main source of water supply is ground water. The GW Quality in more than 117 soums (30% in the entire country) does not meet the drinking water quality standard.**
- **60% of these soums are using a salty water rich in mineralization, 40% have high high hardness depending from the situation of uneven water resource's distribution and mutually different recharge of water resources**
- **People who are living in Khatanbulag soum Dornogobi aimag used drinking water whit As 80 microgram per liter**

Water supply and sanitation has been provided low priority by the central as well as local government.

Social condition:

Laws and programs

- **Law on water 2012**
- **Law on Fees for Utilization of Water and Mineral 2012**
- **The Law on Wastewater Discharge and it's Fee 2012**
- **The law on Urban Water supply, sanitation and Sewerage Use 2002. 2005**
- **The law on mineral water 2003**
- **The law on sanitary 1998**
- **and more than 20 water standards and regulations.**
- **The National Water Program, 2010**
- **Safe drinking water supply program” /Gov. decree No84.2008.03.5/**
- **Program on improving Sanitation Facilities 2006**
- **Given the specific attention that is required for the water and sanitation sector The UN, particularly agencies such as the UNDP, UNICEF, WHO, UNFPA.**
- **The Mongolian Parliament approved program named “Sustainable Development 2030” in 5 February 2016. In this program determined the Millennium Development Goal and indicated about improvement of water sanitation in rural area to get in 60 percent**

We have laws and many programs related to improve Water Supply and Sanitation, have many recommendations and contributions of them. But very low implementation. There are need for coordination between the NW Committee and the UN-Joint program Public couldn't get any tangible results from all of these aid, **Therefore we need an actual work.** Many kind of projects and papers are no need. In this case, my suggestion is that, UN O should care about results of implemented projects and monitor it there is a good practice from Japan ODA.

Water supply

Water scarcity, the gap between human demand for and the availability of water resources in the required quantity and qualities, is the fundamental issue of the water supply in Mongolia

- National Security Concept of Mongolia /2010/, provision 3.5.1.1 states the establishment practice that users bear a responsibility for water resources protection and create conditions for sustained drinking water production and supply in an amount sufficient for the population. Based on this provision herders' supply 7-9 litre water where city average utilize 200 litre which contain much **conflict**.
- Mongolia is huge country and low population, with a **mix nomadic and urban life**.
- Ус хангамж ариун цэврийн байгууламжийн хөдөө хотын ус хэрэглээний ялгаа, зөрчлийн тухай их ярьж бичдэгч өөрчлөлт орсонгүй
- **Data already presented in many sources to an urban and rural disparities in the provision of water and sanitation**



Water supply

The Mongols centuries and suffer from lack of water

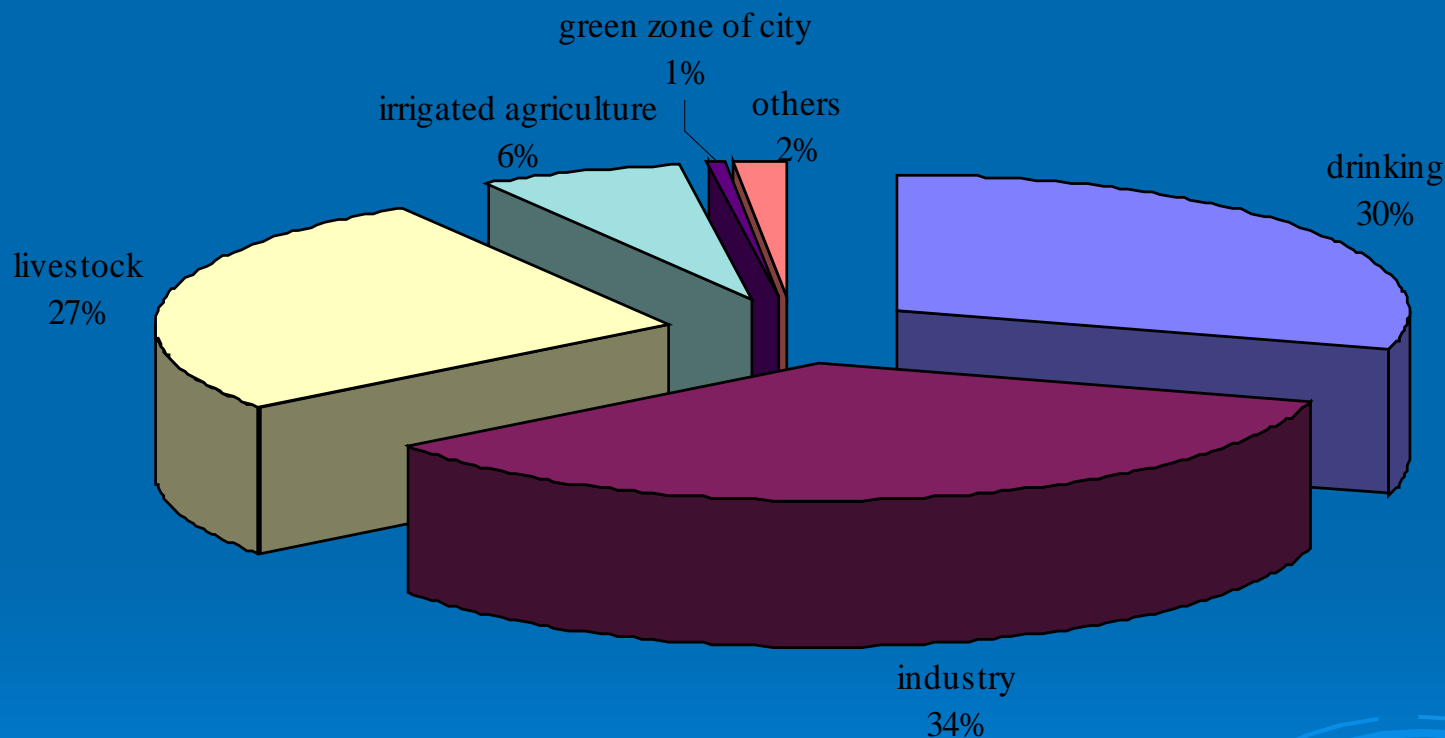
- Regarding to shortage of precipitation and low recharge for the groundwater, cannot found water everywhere.
- “In old time, Mongolian philosophy states “Well water is limited” due to the lack of precipitation people made well with less depth has been used a shallow water wells of perched ground, water during the many thousand years
- The Mongolian vast Gobi desert area has great natural resources but has been used only groundwater resources. Due to there is no surface water resource, Mongolia has historical tradition of utilization shallow groundwater resources by using dug well with 10m depth and low specific yield in arid region.

1938, water use from hand dug well



Water usage

annual usage and demand of water in Mongolia is estimated to be only 0.5 to 0.6 km³, however due to alteration in soil and flora of the river basins economic activities, and negative impacts to the water regime, source and quality have been decreasing.



Only 30.8% of total population is provided with water from the centralized distribution systems. 24.8% gets its water from tank distribution systems. 35.7% from individual wells and 9.1% still uses rivers, stream, spring and other surface water.

Water usage:

Today no clear water resources management in Mongolia.

Mongolian government doesn't pay any attention water supply for all customers.

Recently, Mongolians lost them traditional way of life to get place for living. The main criteria of choose the place where water and grassland. That's why, there is need new approaches for new management of water for half settled modern life.

- According to studies, water consumption of population living Ger (National Dwelling for herders) districts of large cities, provincial centres, and nomadic herders is equal 8-10 liters per person per day, which is 4-5 times lower than the acceptable sanitary norms. However, water consumption in the Ulaanbaatar city exceeds the average of that in developed countries 220-260 liters per person average.
- The state's water policies are defined be the Constitution, Environment protection and Water law and by the policy document such as national water program /2010/ because we need for specific water supply management and related legal regulation. The law on Urban Water supply, sanitation and Sewerage Use adopted in 2002 which was limited only to water supply for drinking water in urban centres. In the future we have to take into consideration the water supply in the rural areas, especially, to fulfil the water rights of herders. In water law, states that, water consumers have the rights to a supply of water that meets quality norms, a right wish is founded in the Constitution. Laws, rules and guidelines of water in Mongolia are having but implement is fully depending on poor water governance.

Water security

- Public health and economic prosperity will always be dependent upon a reliable supply of fresh, clean water.
- 52.2 percent of the population cannot use qualified drinking water
- World Health Organization and International Water Association developed the method to assess the water safety risk however, in Mongolia does not exist responsible organizations and structure for this assessment.
- The research study indicates 20-30 percent of the population disease related with water issue(Udenbor .Sh 2016). The study on coverage of water supply and sanitation and adverse health outcomes households without a pit latrine had more cases of diarrhea /65.2%/ compared to households with a latrine /1.8%/(Basandorj.D 2010)
- In terms of the water security, it's only standard number rather than oriented for the people. It's unclear if the Ministry of Health is responsible for the water security and risk assessment and the ministry tried to establish the temporary study group for the assessment during the non-working hours in Ulaanbaatar city's centralized municipal water supply. 73 risks occurred and activities need to be carried out in order to solve these risks. **But, there is no in charge of organization and structure for this assessment in Mongolia.**
- **Ministry of Health established temporary team for water safety and risk assessment for UB. They tried to do the risk assessment in the central water supply, and found 73 risks. Therefore, many work need to do.**
- The water supply is not improved because do not do the actual work.

Water management challenges

- Due to the lack of clear policies and implementation programs, the public and donor community remains ill-informed and highly confused about the numerous programs in existence. This also creates issues related to inefficiency of institutional structure overlapping and unnecessary duplication of work and inefficient use of funds.
- Due to the non existence of consolidated management structure for **water economy sector** at a systematic level, a fragmented approach to the complex issues on water and sanitation has resulted. Some aspects have overlooked due to lack of coordination between policy makers and implementing agencies. For example, currently it is unclear, which ministry is responsible for water supply to soum /adm. unit/ centers.
- At the institutional level, the capacity and funds are limited for implementing a range of program's and policies.. The institutional issues also require efficient coordination and synergy amongst numerous institutions at national and local levels.
- **There are also a disparity on water pricing.** While apartment dwellers paid 1 tug per liter for water , the ger district paid 3-5 times more for every liter
- At the individual level, within the civil service, capacities are also very weak and require reform. The deficiencies in the system outlined above provide significant challenges for the research and management of water resources.
- **Emerging objective for the government is the sustainable utilization of the water resource according to the technology and this is the biggest challenge at this stage due to the lack of this structure.**
- **It is considered as priority delivery of water supply and sanitation facilities required at the management level.**

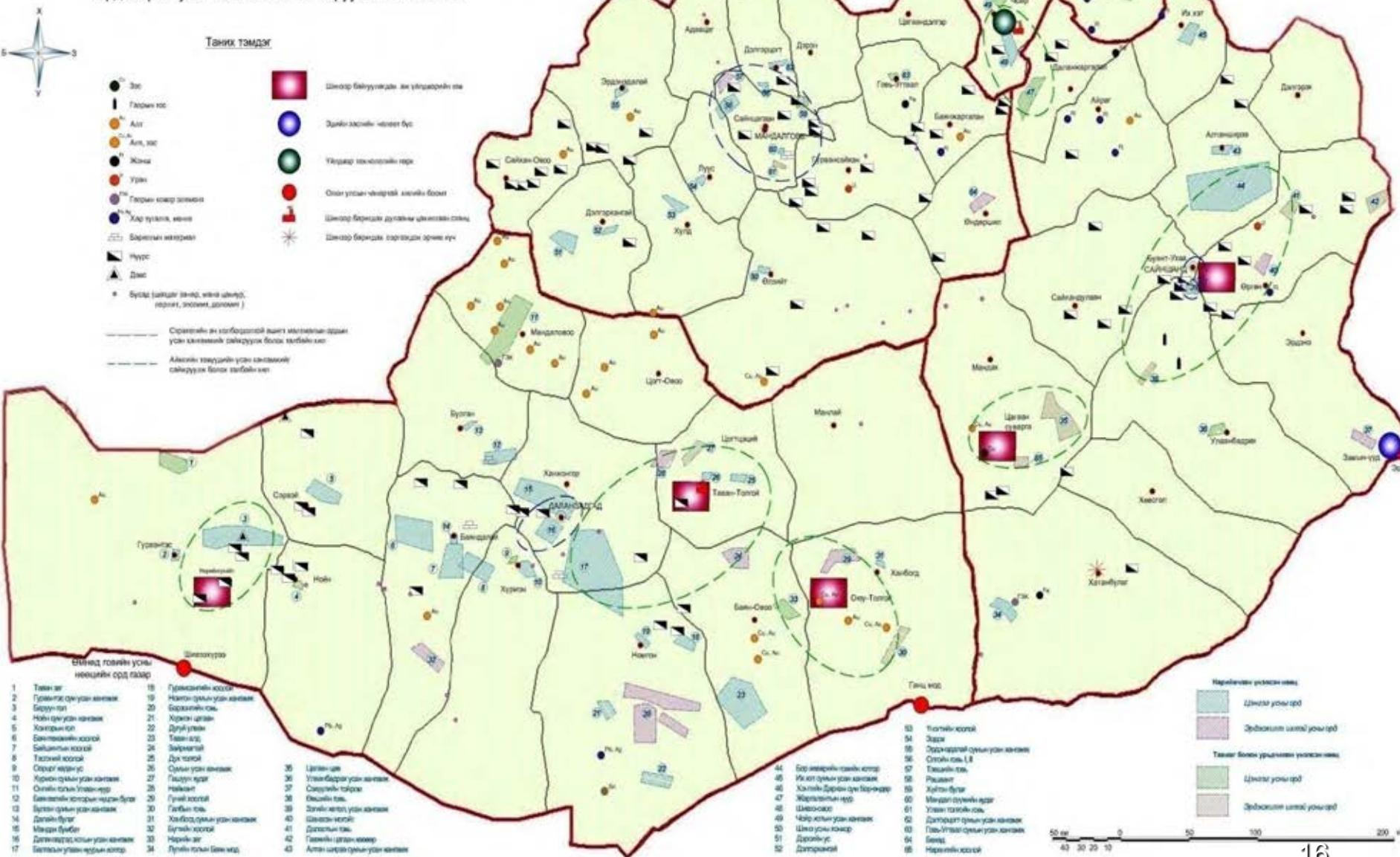
The Central Asian Internal Drainage Basin, which includes arid and semi-arid regions, covers 68% of the total territory of Mongolia. Perennial rivers and streams with permanent flow are very rare in these areas. One-third of the Mongolia's population lives in water-stressed areas where lack of water is the major reason for slow economic development.



Mongolian Gobi, Steppe zone faces a water crisis, because the vast territory haven't surface water. In the Arid region of Mongolia, GW has been the source of 100% of the all kind of consumption. In SGR by effect mining activity good Q aquifers are depleting due to over exploration.

The South Gobi Region

Өмнөд говийн бүсийн стратегийн ач холбогдолтой ашигт малтмалын орд газрын усан хангамжийг сайжруулах төлөвлөгөө



Water management challenges

- The following problems related to water supply management reflected in Mongolia: Many programs exist but with no implementation plan and lack of investment capacity. Very low implementation
- **Supply by drinking water as far as needs**
- **Water transfer by conduit for into less water territories**
- **Fresh water delivery supply for the regions' with high natural water mineral content**
- **Utilize the Hydropower energy, reduce the CO₂**
- **Develop the water tourism**
- **Develop the fishery farm, t**
- **Establish water reservoir adjusting the flow in shallow rivers'**

- World Bank supported the research study on establishing the reservoir in territory with lack of water supply. However, Russia is against this activity and ignoring the Mongolian legislation. It's hard to comprehend the UNESCO World Heritage Centre's support for the Russian side.

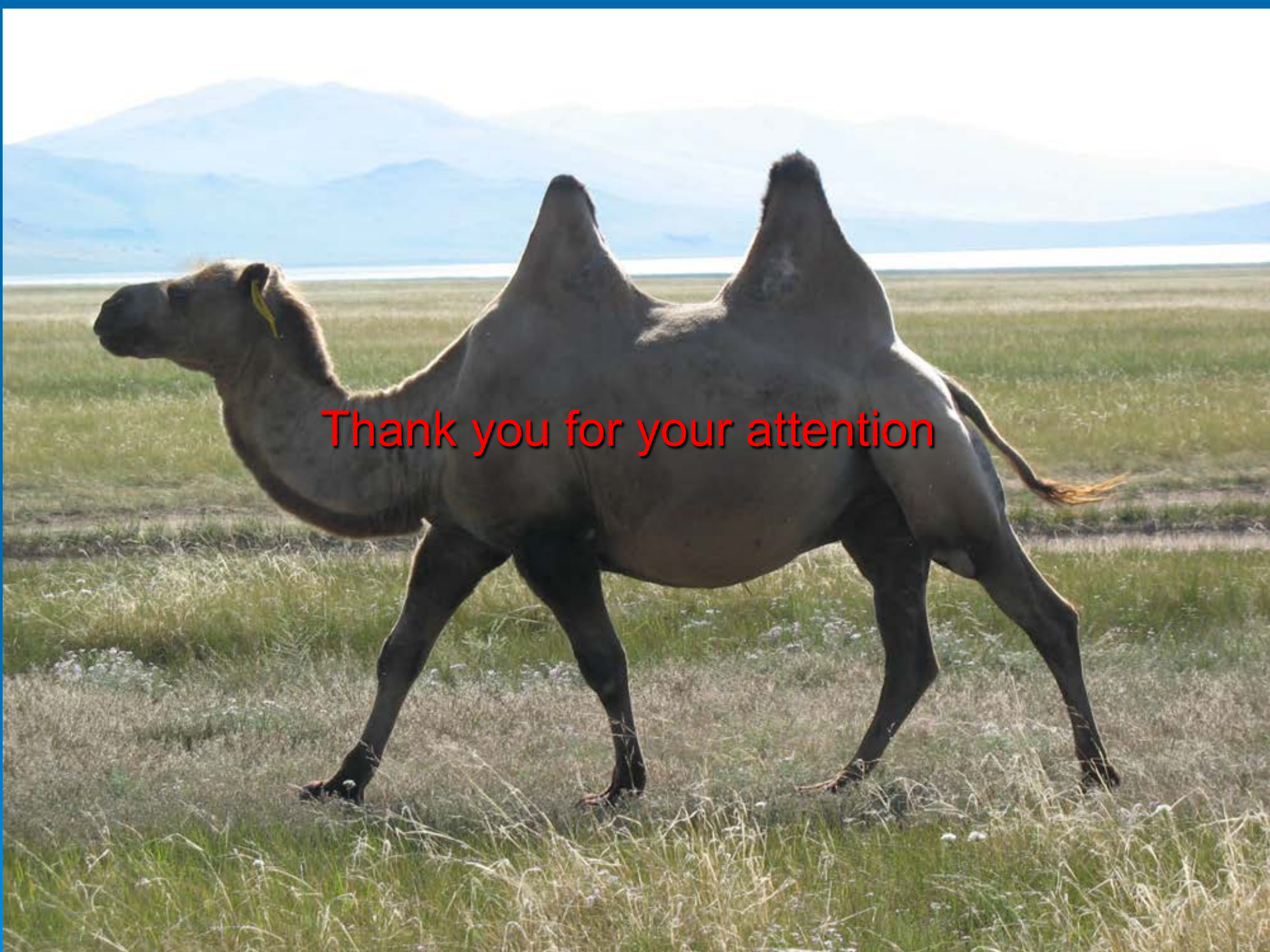
- It's necessary to cooperate with UNESCO in many fields and provide them proper understandings of Mongolian condition. Involve the IGGP for the groundwater study in Gobi Desert, improving the water sector's administration and capacity.

Drinking water ... Distance to drinking water source 1-22 km?

Nomadic style of livestock breeding is a battle to grassland and water sources

No watering pasture is not pasture it is only field with





Thank you for your attention

Annex 12 - Adoption of Resolutions

Draft Synthesis of the International and national water dialogue on the delivery of SDG 6 in Mongolia and wider Asia and the Pacific region

25 October 2016, Ulaanbaatar, Mongolia

Preamble

On 25th October 2016, UNESCO – through its Regional Sciences Bureau for Asia and the Pacific and supported by its office in Beijing, the Mongolian National Commission for UNESCO in cooperation with the Ministry of Environment and Tourism of Mongolia conducted the international and national water dialogue on the delivery of Sustainable Development Goal 6 “Ensure availability and sustainable management of water and sanitation for all” in Mongolia and wider Asia and the Pacific region.

Water is essential to sustainable development. This is reflected in the United Nations 2030 Agenda through the presence of cross-cutting water-related challenges and issues across many of its Sustainable Development Goals. Access to water is a precondition for food production, for the development of sustainable cities, for reducing inequalities, for life on land – to name but a few. And water is addressed specifically through Sustainable Development Goal (SDG) 6 “Ensure availability and sustainable management of water and sanitation for all”.

With six main and two supportive targets, SDG 6 sets detailed goals for a series of key water-related issues: 1) equitable and safe access to drinking water, 2) equitable and safe access to sanitation, 3) improvement of water quality, 4) increase water use efficiency, 5) implementation of integrated water resource management (IWRM) including at transboundary level, 6) protection of water-related ecosystems, a) expansion of international cooperation for capacity building and b) engagement of local communities in water management.

In UNESCO, global, regional and local solutions to water challenges and issues are considered mainly within the organization’s International Hydrological Programme (IHP), an intergovernmental programme currently implementing its 8th eight-year phase (2014-2021) under the theme “Water security: Responses to Local, Regional, and Global Challenges”. IHP’s work is articulated around six major themes, three of which are directly related to SDG6:

- Theme 3: addressing water scarcity and quality
- Theme 4: water and human settlements of the future
- Theme 5: ecohydrology – engineering harmony for a sustainable world

Challenges

A total of 46 national and international experts from 13 countries representing the networks of three UNESCO intergovernmental scientific programmes IHP, MAB (Man and Biosphere Programme), IGGP (International Geoscience and Geoparks Programme) discussed over three sessions:

- Water Security in Arid Environment
- Integrated UNESCO initiatives in Water and Environment
- Mongolian perspectives on water security

The experts identified the main Mongolian needs to be addressed in the pursuit of SDG6 and its related targets as follows:

- Need to reduce the current vulnerability of drinking water supply, which is highly dependent on groundwater recharged through rivers and precipitation (SDG 6 Target 1)
- Need for customised integrated water governance in arid and semi-arid regions (SDG 6 Targets 1,2,3,4,5)
- Need for local community/multi-stakeholder participation process in water governance processes (SDG 6 Targets 1,2,3,4,b)
- Need for efficient IWRM implementation linking with local communities, potential users and ecosystems (forest and others) management to combat desertification, soil erosion and sand movement (SDG6 Targets 1,2,3,4,5,6)
- Need to raise capacity for enhanced social and institutional resilience to climate variability (drought, desertification) through further international cooperation in the field of risk identification, policy for disaster risk reduction, STI and local knowledge. (SDG6 Targets 1,2,3,4,5,6,a)
- Need to raise capacity water sector management based on science and stakeholder participation approach
- Need to improve water diplomacy ~~for~~ with two neighbours (China and Russia) and international organizations for enhancing water security of country and implement water strategies against climate change's negative impacts and coming water stresses

Opportunities and actions

Mongolia is an active member of IHP, MAB and IGPP. From its national committees and scientific networks and through the UNESCO Regional Sciences Bureau in Jakarta and the UNESCO Representative Office to Mongolia in Beijing, Mongolia has access to a regional and global pool of leading experts and state-of-the-art resources, tools and partners, including UNESCO's global family of Category 2 Centres and Chairs.

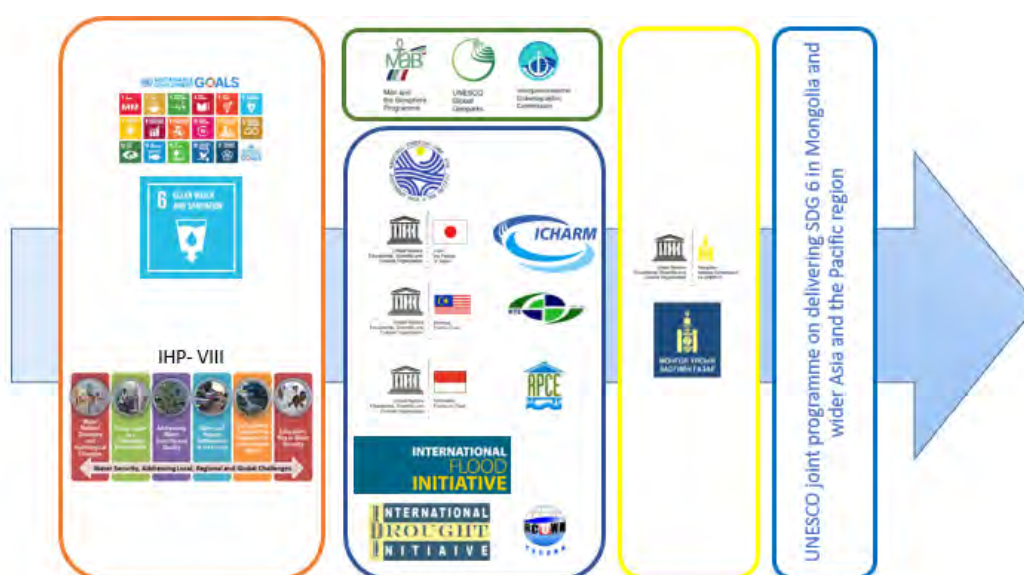


Figure 1 National and Regional mechanism for SDG 6 delivery.

Detailed discussions were held around the following three questions:

- What are the priority actions in building resilience and mitigating the negative impacts of climate change in the context of water security in arid and semi-arid regions?
- How can IWRM be strengthened including through the development of synergies with other UNESCO programmes such as MAB and IGGP?
- What are the specific needs for water education and capacity building for SDG6 delivery in Mongolia and the wider Asia-Pacific region?

Discussions resulted in the following proposed actions (details in Annex):

- Strengthen transdisciplinary capacity building in local institutions for IWRM including climate change resilience by enhancing regional collaboration with the IHP-RSC network and Category 2 water centres, chairs and initiatives such as the International Flood Initiative (IFI) and the International Drought Initiative (IDI) with enhanced data access and sharing.
- Strengthen specific capacity for groundwater monitoring and management through enhanced data access and sharing, regional collaboration through the IHP-RSC network, Category 2 water centres, UNESCO Chairs, IDI, G-WADI and establish collaboration with IGRAC and Asia-Pacific Geoparks Network (APGN), a network of geologists.
- Strengthen transdisciplinary capacity for multi-stakeholder water governance and science based policy making in UNESCO Biosphere Reserves (BR) and river basins by recognising ecosystem sustainability and adaptability.
- Strengthen transdisciplinary capacity for implementation of BR through enhanced regional collaboration with the Asia-Pacific Biosphere Reserves network (APBRnet) through the East-Asia Biosphere Reserves network (EABRN), and promote BRs as model for river basin sustainable development where relevant.
- Build/Strengthen transdisciplinary capacity for UNESCO Global Geopark establishment in Mongolia through enhanced regional collaboration with APGN and promote geoparks as model for river basins sustainable development where relevant.
- Initiate groundwater recharge program for drinking water supply and economic water security areas based on international and bilateral cooperation and collaboration with UNESCO network organizations.
- Promote wastewater reuse and eco-sanitation in the cities especially in groundwater recharge zones and lakes.
- Increase supports from UNESCO to implementation of UNESCO programmes in Mongolia.

The participants also took note of the Mongolian UNDAF 2017-2021 and its three broad collective results:

- (1) promoting inclusive growth and sustainable management of natural resources;
- (2) enhancing social protection and utilization of quality and equitable social services, and
- (3) fostering voice and strengthening accountability.

In particular, the importance of water was stressed for attaining these goals and the specific water-related targets and indicators included in particular under result 2.

ANNEX:

Dialogue and Group Discussions

Discussion Group 1

Discussion Topic

What are the priority actions in building resilience and mitigating negative impacts of climate change in the context of water security in arid and semi-arid regions?

Participants: Takeuchi, Takara, Nyamdavaa, G.Davaa Tabios, Purevdorj, Batjargal, Looser, Adiyasuren, Jamieson (5 MNG, 2 JPN, 1 NZ, 1 PHL, 1 GER)

Preliminary discussions: First the group conducted preliminary discussions to agree on several aspects necessary before identifying the priority actions in building resilience and mitigating negative impacts of climate change. The following points were agreed within the group:

- a) Policy and management decisions should be science based
- b) There is a need to make the distinction between resilience and mitigation in particular between engineering resilience (ability to recover fast) versus social-ecological context (ability to persist or adapt)
- c) The need to recognize the sustainability and adaptability of ecosystem
- d) The need to communicate clearly on the meaning of water-efficiency which implies a wise-use of water resources with a demand-driven management
- e) The need to enhance the ability to communicate briefly and clearly including negative impacts action

Actions:

- a) Proper Risk impact assessment is necessary (both in terms of water quality and quantity, including groundwater monitoring)
- b) Solutions need to be sustainable including indigenous knowledge when more appropriate than modern science
- c) Implement good information exchanges including multi-sources (like Remote Sensing, satellites, big data) and knowledge flow infrastructure
- d) Include future scenario setting or forecasting
- e) There is a need to increase women participation in high level government decision making and for community level, acknowledge women play major (dominant?) role in household decisions
- f) Need for inclusive cross-cutting transdisciplinary approach including all sectors (private, civil, public, academia)

Dialogue and Group Discussions

Discussion Group 2

Discussion Topic

“How can IWRM be strengthened including through the development of synergies with other UNESCO programmes such as MAB and IGGP?”

The Discussion Group

The group was constituted of following persons: Prof Lee, Dr Elfith, Prof Kobayashi...

Summary of the Main conclusions: the discussion yielded the following actions in order to strengthen IWRM through the development of synergies with other UNESCO programmes such as MAB and IGGP:

1. Need to include IWRM approach which is inclusive and collective
2. Need to ensure Bottom-up approach
3. Need to take in account cultural aspects
4. Need for toolkits to be shared by all programmes
5. Need to raise IWRM concepts to Biosphere Reserves and Geoparks management
6. Need for paradigm shift and not work in silos and integrate all
7. Need to connect between science and policy so that science become actionable
8. Need to strengthen information sharing
9. Need for exchange of good practices, expertise in specific areas and data at local, national and regional level
10. Need for more training
11. Eco-DRR needs to be included in IWRM approach
12. Need to create common goals between IHP/IWRM and MAB, IGGP communities
13. Need for a follow-up action with proper common proposals and projects
14. Need for more active participation from the delegations
15. Need to conduct an assessment study of IWRM projects: what are the status after their implementation and need to report and share
16. Need to acknowledge water is important for everybody through a clear communication
17. All suggestions should be strengthened into a programme: “Strengthening action programme IWRM implementation in AP”
18. Use “water security” instead of IWRM as the term is more approachable for general public.

Dialogue and Group Discussions

Discussion Group 3: Needs for SDG 6 Delivery

Discussion Topic

“What are the specific needs for water education and capacity building for SDG 6 delivery in Mongolia and the wider Asia-Pacific region.”

The Discussion Group

The discussion group consisted of 12 members drawn from Mongolian Government Ministries, NGOs and from members of the RSC, half of the group were female. The group paid particular attention to the points that had been raised in the presentations during the dialogue.

Summary of the Main Conclusions

1. **Criteria for safely managed sanitation.** Sanitation is often not much discussed in polite society, yet is a critical part of the SDG 6 targets. The MDGs took prescriptive, western approaches to improved sanitation. For nomadic people and low density populations that live on low small islands such approaches are often not applicable or can even increase risks. The emphasis should be on appropriate, safely managed sanitation to improve health outcomes, suitable for nomadic and low density remote outer island populations.
2. **Assessing accurate water footprints.** Universal and equitable access to safe and affordable drinking water is a key target in SDG6. We have heard that apartment dwellers in Ulaanbaatar use between 180 to 240 L/person/day while people who live in gers either in nomadic or peri-urban areas have between 6 to 10 L/person/day. Such figures can be misleading, as ger dwellers and other rural and peri-urban populations often access water from many sources, including relatives and friends and also many use water to supply livestock. There is an urgent need for accurate assessment of the true water usage from multiple sources of peri-urban and rural communities. Some governments have taken notice of the UN's 2010 resolution that water is a basic right and have assigned a basic quantity (such as 50 L/person/day) as a person's free entitlement.
3. **Engaging the community.** We have heard a lot at this meeting about the fundamental importance of engaging the community in water management and indeed one of the targets of SDG6 is to support and strengthen the participation of local communities in improving water and sanitation management. Community engagement requires special skills, empathy and extreme sensitivity to cultural and religious nuances frequently outside of the usual curricula of water supply and sanitation engineers. Training in ways to respectfully engage communities is required to meet this SDG target.
4. **Entraining political leaders.** While not a specific SDG6 target, we have heard in this meeting the importance of having political leaders to champion water reforms and improvements. Learning from successful case studies that have successfully entrained political leadership in the water reform and improvement process will be important for meeting SDG targets.
5. **Sharing experiences.** One of the great advantages of the UNESCO IHP is that it draws together people from a wide range of cultures, races and geographic and hydrologic situations. There is a rich depth of experience and promoting the sharing of those experience, such as occurs at the RSC for SEAP meetings is a valuable tool for building capacity to meet the SDG6 targets.
6. **Multi-trans disciplinary skills.** The successful attainment of SDG 6 targets requires a broad range of disciplinary skills: engineering, science, social science, economics and many others. In truly integrated water resource management a complex set of interactive and intertwined

processes are at play. What is the most efficient way of building training programmes that acknowledge the complexity of the tasks we face and promotes an understanding and respect for other disciplines?

7. **Reliable, accessible information.** We have heard the often-repeated phrase that you can't manage what you don't know. Beyond management, community engagement requires accessible, reliable information at a level that can be appreciated by the broader community. The supply of appropriate, reliable and readily accessible information requires both training in how data is assessed as reliable and in what form it is presented.

24th RSC-IHP Meeting, 24-26 October 2016, Ulaanbaatar, Mongolia

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