



# HELP – GWP Consultation on Draft Principles on Investment and Financing for Water-related disaster risk reduction

April 23, 2019.  
Uruguay  
GWP South America



## ABBREVIATIONS AND ACRONYMS

ANA	Water Authority of Peru
CEMADEN	Center for Natural Disaster Monitoring and Alerts
DEM	Digital Elevation Model
DINAGUA	National Water Division
DRR	Disaster Risk Reduction
GRIPS	National Graduate Institute for Policy Studies
GWP	Global Water Partnership
HELP	High-level Experts and Leaders Panel on Water and Disasters
IMFIA	Mechanics of Fluids and Environmental
JICA	Japan International Cooperation Agency
LATU	Technological Laboratory of Uruguay
SARAS INSTITUTE	South American Institute for Resilience and Sustainability Studies
SDG	Sustainable Development Goals
UNSGAB	UN Secretary General's Advisory Board on water and Sanitation (UNSGAB)
WMO	World Meteorological Organization



# ÍNDICE

## CONTENIDO

ABBREVIATIONS AND ACRONYMS ..... 2

Executive Summary ..... 5

    Workshop background: ..... 5

    Objective ..... 5

    Methodology ..... 6

Opening Remarks ..... 6

Self-Introduction of Participants ..... 7

    GWP Team ..... 8

OVERVIEW OF WATER-RELATED DISASTER AND APPROACHES IN SOUTH AMERICA - REGIONAL PERSPECTIVE ..... 9

INTRODUCTION TO HELP DRAFT PRINCIPLES ..... 9

GROUP DISCUSSION ..... 10

DISCUSSION 1- About the principles ..... 10

    Group 1 ..... 10

    Conclusion of Discussion 1 – Group 1 ..... 12

    Group 2 ..... 12

    Conclusions of Discussion 1 - Group 2 ..... 16

DISCUSSION 2 - Operationalization of the principles ..... 16

    Group 1 ..... 16

    Conclusions of Discussion 2 – Group 1 ..... 17

    Group 2 ..... 17

    Conclusions of Discussion 2 – Group 2 ..... 21

DISCUSSION 3- Water-related disaster risk reduction – Experience and Response ..... 22

    CASE STUDY 1 – Prof. Masato Kobiyama ..... 22

    CASE STUDY 2 – Pedro Antonio Rivero ..... 23

    REGIONAL PROJECT PROPOSAL: Dr. Néstor Mazzeo. .... 23



CLOSING REMARKS .....	25
VISIT TO THE TECHNOLOGICAL LABORATORY OF URUGUAY .....	25
PHOTO GALLERY.....	25
APPENDICES .....	30
APPENDIX 1 .....	31
Workshop Program .....	31
APPENDIX 2.....	34
Proposed Principles.....	34
APPENDIX 3.....	37
Questionnaire on Water-related Disaster Risk Reduction by HELP and GRIPS .....	37
APPENDIX 4 – .....	44
Overview of Water-related disaster and approaches in South America: Regional perspective. Alejandra Mujica .....	44
APPENDIX 5.....	48
Global and Asian Challenges on Water-related Disasters and .....	48
Position of Principles on Investment and Financing for Water-related Disaster Risk Reduction Prof. Kenzo Hiroki.....	48
APPENDIX 6.....	77
Some problems of water-related risk reduction in Southern Brazil. Prof. Masato Kobiyama .....	77
APPENDIX 7.....	103
Progress of the Aquatic Ecosystems’ Governance and Challenges in South America, Dr. Néstor Mazzeo.....	103



## EXECUTIVE SUMMARY

**Workshop background:** This consultation was jointly organized by High-level Experts and Leaders Panel on Water and Disasters (HELP) and Global Water Partnership.

**The (HELP/UNSGAB)** was convened at the request of [the UN Secretary General's Advisory Board on water and Sanitation \(UNSGAB\)](#) in 2007, under the Presidency of H.E. Dr. Han Seung-soo, Prime Minister of the Republic of Korea and Former President of the Korea Water Forum. The HELP included twenty-one experts in disaster preparedness and response and international issues, and was co-moderated by the World Water Council, the UN Secretariat for the International Strategy for Disaster Reduction (UNISDR), the Japan Water Forum and the Korea Water Forum. Some of its objectives are: raising awareness at the highest levels and regularizing in-depth discussion on water and disasters at global level; analyzing and promoting investment and financing for water-related disasters; and helping implementation of local projects.

**Global Water Partnership** is a large, diverse, inclusive, multi-stakeholder partnership that supports communities and countries to improve the way they manage water.

### **Consultation workshop:**

**Date:** April 23, 2019.

**Venue:** Room Las Camelias, Technological Laboratory of Uruguay (LATU) in Montevideo, Uruguay.

### **Objective**

The objective of the consultation was to capture comments and suggestions from regional experts on the topic to improve and evaluate the Principles on Investments and Financing for Water-Related Disaster Risk Reduction, proposed by HELP. Participants shared their knowledge and expertise to integrate the regional perspective in the project carried out by HELP and GRIP in a jointly effort with the Government of Japan.



## Methodology

The workshop methodology included plenary presentations and group discussions as well as a discussion on a regional case study. (Appendix 1 shows the workshop program).

Before the workshop, participants had received the proposed Principles and a questionnaire consisting of four parts. (Appendix 2 and 3). The objective of this questionnaire survey was to know opinions of experts and stakeholders on various aspects of water-related disaster risk reduction (DRR).

The purpose of this report is to summarize the main points during consultation and emerging conclusions of discussion on the draft principles on investment and financing for water-related DRR presented by HELP.

## OPENING REMARKS

Ms. Alejandra Mujica, Regional Coordinator of GWP thanked the experts for taking their time to participate in this Consultation and introduced panelists Tomosuki Okada, Kenzo Hiroki and Diana Míguez representing GWP Uruguay. She expressed her appreciation to Tomoaki Nozawa, representing the Embassy of Japan in Uruguay for being present, and Yumiko Yasuda, Frederik Pischke and Sara Oppenheimer from the GWP team from Stockholm for their support.

Dr. Diana Míguez, vice President of GWP Uruguay, welcomed and thanked participants for attending this workshop at the Technological Laboratory of Uruguay (LATU), where she works as Water Program Director at Latitude-LATU Research Foundation.

She said that GWP is trying to build in more members to the association and produce more impact on research in Uruguay by enabling interaction with other institutions and associations. Consultation results will not only be relevant for our country but also at a global level. She hoped that participants would find this event useful.

Professor Kenzo Hiroki, HELP Coordinator and Professor at GRIPS, said that he has been collaborating to the GWP for twenty years and that he was delighted to be in South America and Uruguay. He emphasized the importance of finance and investment on water at global and national level. His presentation “Global and Asian Challenges on Water Disasters and Position of Principles on Investment” is shown in Appendix 5. He mentioned the tragedy occurred in Africa last month where many people were killed, and stressed that what happened in Africa may happen anywhere. The frequency of disasters is increasing, he said, and showed how the number of natural disasters and



damage are increasing exponentially. Among other figures, he stated that the number of people affected by disasters was 5.7 billion in the last twenty years. He stated: “*You might encounter disaster more than three times in your life*”. The world has lost 2.7 trillion USD in 20 years (1995-2015) by disasters. 70 % of the loss by water-related disasters.

He stressed that we have to be prepared to prevent loss of lives and properties. On the investment principle he said that this is the reason why they were here, to ask opinions on how to improve investment on water disasters both for enhance preparedness and to strengthen resilience, and that he wanted these principles to benefit people in Uruguay.

## SELF-INTRODUCTION OF PARTICIPANTS

After finishing his presentation, Alejandra Mujica, asked everyone to introduce themselves.

**Dr. Néstor Mazzeo.** Country: Uruguay. Executive Director of the South American Institute for Resilience and Sustainability Studies (SARAS) for the Caribbean and Uruguay. Specializes on water quality and drinking water supply issues.

**Dra. Diana Míguez.** Country: Uruguay. Water Program Director Latitude - LATU Research Foundation. Vice President of GWP. Works on water contamination, resource valorization and preventive measures for climate change.

**Lic. Pablo Kaloghlian.** Country: Argentina. International Relations Consultant at Secretary of Infrastructure and Water Policy of Argentina.

**Prof. Masato Kobiyama.** Country: Brazil. Professor. Researcher and specialist in Brazil.

**Dr. Luis Silveira.** Country: Uruguay. Professor. Engineering Faculty of the University of the Republic. Director of the Mechanics of Fluids and Environmental Engineering (IMFIA).

**Mag. Rosana Gaudioso.** Country: Uruguay. Water and Climate Change Technician. Works at the National Secretary of Water in Uruguay. Currently, is working on an action plan related to water quality and participates in a working group related to the Disaster National Emergency System, Presidency of Uruguay.



**Eng. Pedro Antonio Rivero.** Country: Peru. Works at the National Water Authority of Peru. (ANA)

**Mr. Kazumi Kobayashi:** Implemented a project in Chile about earthquake and tsunami main issues. He is happy to have the possibility of cooperation in the region. He is very interested in attending this meeting.

**Ms. Naomi Hiroi.** Assistant JICA

**Eng. Micaela Soriano.** Country: Argentina. National Water Institute (INA). Works in hydrology research and water resources

**Dr. Silvana Alcoz.** Country: Uruguay. Institute of Housing and Planning. Currently regional Technological Advisor of the National Water Division (DINAGUA). Her work is related to cooperation and international relations.

**Eng. Claudia Crosa.** Country: Paraguay. Independent consultant. Works on issues concerning governmental management of water.

#### GWP Team

**Professor Tomoyuki Okada.** Country: Japan. Director for International Coordination of River Engineering at the Ministry of Land, Infrastructure, Transport and Tourism. Said that this Ministry is supporting water and disaster cooperation and disaster-related issues. Together with GWP, organizes consultation meetings in different regions

**Professor Kenzo Hiroki.** Country: Japan. Expert on Water and Disaster; International Cooperation. Works on International Policy on Water and Disasters

**Alejandra Mujica.** Country: Uruguay. GWP South America Regional Coordinator

**Corina Piaggio.** Country: Uruguay. Communications Officer

**Marcelo Farro.** Country: Uruguay. Administrative Officer

**María Victoria Míguez.** Country: Uruguay. Rapporteur





## OVERVIEW OF WATER-RELATED DISASTER AND APPROACHES IN SOUTH AMERICA - REGIONAL PERSPECTIVE

Alejandra Mujica explained that Mr. Miguel Doria was unable to make his presentation for medical reasons.

She showed a PPT presentation “Water-Related Disaster and Approaches in South America” which is included in Appendix 4. She pointed out that Latin America must walk towards achievement of SDG, but is still far from the milestones that had been set. Mujica said that disaster cause thousands of lives and billions of dollars in the world. Natural disasters are barriers for development. Poverty and inequity have been increasing and all these problems must be an integral part of the political agenda. Currently financing focuses on the response to emergency and reconstruction, but should be enhanced in anticipating disaster and damages.

### INTRODUCTION TO HELP DRAFT PRINCIPLES

Prof. Kenzo Hiroki presented the HELP draft principles. His presentation “Global and Asian Challenges on Water-Related Disasters and Position of Principles on Investment and Financing for Water-Related Disaster Risk Reduction” is included in Appendix 5. He stressed the need to double the investment and financing for water-related DRR and shift international assistance from disaster response to preparedness. Currently 90% of the international assistance is directed for emergency response and reconstruction, whereas the amount disbursed for disaster prevention and preparedness is limited to only 10%.

He emphasized that water-related disaster risk reduction is indispensable and he also mentioned that science and technology should support decision making. He outlined the 6 SDG Goals and the Four Priorities for Action of Sendai Framework:

1. Understanding disaster risk.
2. Strengthening disaster risk governance to manage disaster risk.
3. Investing in disaster risk reduction for resilience.
4. Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction.



After reading the consultation principles (Objectives, Organizers and Participants), he mentioned the schedule of consultations and announced that on June 24, the 4<sup>th</sup> UN Special Session will be held in New York City, where emerging findings of consultations carried out in different countries will be presented.

He said that he expected a brain storming session, asked participants to read the principles thoroughly, answer the questionnaire and write comments in a sheet of paper. Participants were given 30 minutes to fill in the questionnaire form with their perception about water disaster response, modification of the principles and messages from stakeholders to HELP. After that, a group discussion would be held.

## GROUP DISCUSSION

In this section of the consultation all participants were divided into two smaller groups with facilitators and rapporteurs to share their ideas. Each group had to choose a moderator and a rapporteur to share a summary of the discussion with the other group.

## DISCUSSION 1- ABOUT THE PRINCIPLES

### Group 1

Silvana Alcoz suggested that soft and hard measures should be added to infrastructure on Principle 1. They are of similar importance. Political interest affects the implementation of soft measures. People may know the risk of their land but, because of political interests, they continue living in the same place.

On Principle V she mentioned that funds are needed to monitor and modelling. In our countries (developing countries) if we do not know the risk, we cannot manage it. In order to apply the existing regulations, we need people and resources to check whether the implementation was successful or not. However, there is lack of resources in all institutions to do it.

Rossana Gaudioso pointed out that the ratio 10:90 a 90:10 is a bit rigid and that it may become variable in the future. She thinks principle Number I is correct, but agreed with Alcoz that there should be more emphasis on adaptation measures.

She suggested that on Principle II.7 land use should be highlighted and included in long-term strategies, and that the title of Principle 3 should be changed because it



emphasizes financing over other important aspects such as governance and institutional management.

Regarding Principle V.18. investing must be as effective as other measures. Principles should include reference to risk preparedness; it is not only a matter of infrastructure but of education, she said.

Pedro Rivero observed that a summary should be added at the beginning and said that no less than five, but ten principles would be enough, so they can be easily understood and accepted by everybody. Also, he suggested the addition of strategies to convince government of allocating resources because, in his opinion, the most important problem is to convince ministries to put money. He said that there is lack of capacity and preparation to implement these principles. Finally, he noted that these principles do not mention climate change nor the effects associated to it. He stressed that there are three important points to consider: principles, strategy, and an implementation plan. The problem is how to get the money and have the capacity to make the best use of it.

Belen Reyes made a comment about climate change: she agreed with the document in general, and said that it could be used for climate disasters. There is need to include mitigation and adaptation to climate change and variability into urban planning. Efforts should be made to promote the adaptive capacity and resilience of the society, particularly focused on vulnerable groups.

Claudia Crosa agreed with Mr. Rivero on the fact that twenty principles are too many and there should be more focus on a few concepts. She said that the corruption issue should be mentioned in the principles. When a disaster occurs, institutions must be transparent when managing resources. The need to secure integrity of institutions must be emphasized.

Micaela Suriano said that shift from 10-90 to 90-10 should be progressive and must take into account local problems. She also suggested the following changes: add “structural and nonstructural measures” to the wording of Principle II.4 and urban and territorial planning to principle II.7.

The climate change issue, the role and responsibilities of world’s powers and their contribution to greenhouse gas emissions should be an integral part of the principles. Developing countries are highly affected by climate change and their consequences.



The moderator summarized the session in the following conclusions:

### Conclusion of Discussion 1 – Group 1

1. Document format: reduce the number of principles. Add a strategy and then an action plan with goals and budget associated.
2. Include more explicitly that nonstructural measures are as important as structural measures, as well as urban and territorial planning.
3. Add a new element: Integrity and transparency of the institutions that manage the funds.
4. To manage the risk, you should know the risk. To know the risk, we need to know hazard, vulnerability and exposition. And to know the hazard it is very important to emphasize the need to secure funding for data collection, maintenance of monitoring stations and prepared human resources to perform those tasks.
5. The shift from ratio 10%:90% to 90%:10% should be progressive and taking into account local issues.
6. Include the climate change issue more explicitly in the Principles.

### Group 2

Néstor Mazzeo said that it was a very good proposal of principles mainly focus on infrastructure. This works very well, for example in the Netherlands, but in South America we must also include green alternatives, not only structural measures. He said that land planning plays a key role. Although there are very low-density areas in Uruguay, like Durazno and Artigas, people occupy the flood plains, and the same picture can be seen in other Latin American countries. People do not pay attention to anticipation strategies.

Diana Míguez said that climate change should be also considered and that measures should be taken to diminish the global temperature, the greenhouse effect. She agreed with Mazzeo on the need to include green infrastructure and improve location of houses and land planning. *“We should see it as a social problem”*, she said. People choose to come back to their land even though the following year they have to face recurrent damages, infection risks, diseases, insects, etc. *“How do you deal with this situation if people do not want to leave?”* Citizen awareness must be really strengthened in ways that people understand where to build their houses. Also, there should be a “plan B”, there must be plans to relocate these people. They stay in military tents for a while and then they came back to their homes.



Pablo Kaloghlian pointed out that people do not want to move because sometimes that is the place where they have their living means and traditions. For example, in the Northern part of Argentina they get food, fish from the river, so if they moved, they would have to find a new way of living.

Pablo Reali said that it is a social and economic problem and Nestor Mazzeo agreed that it is quite difficult to avoid occupation on flood plains. We still have not found the alternative.

Kaloghlian said that an integral approach about territorial planning should be made. Currently Argentina is working on territorial planning for the first time. Furthermore, they have a three-pillar vision about integral risk management: Information to people, Government and management and infrastructure. With these three pillars, he said, we can think of risk reduction.

Míguez stressed that a sustainable solution should be pursued. Kaloghlian added that it should be an economic, social and environmentally sustainable solution.

Mazzeo emphasized the importance of specifying in the Principles the different kinds of infrastructure, including green infrastructure.

Luis Silveira said that floods cause important damages to infrastructure, but draughts in Uruguay and Argentina have also a very important economic impact.

Masato Kobiyama said that all countries in the region share one big problem: the law. *"There are 'very nice laws' but they are not well applied.* In Brazil everybody can occupy the land. Last week there was a disaster in Rio de Janeiro on protected areas. Everybody knows that this place is really dangerous but there is no enforcement capacity.

Mazzeo agreed and said that when they studied the water supply crisis in in Sao Paulo, they noticed that many problems were related to the government. There are good laws, but badly organized.

Kaloghlian indicated that in Argentina water is owned by each province, so the Government must negotiate with provinces. The Government is working hard on creating an interjurisdictional-based organization in order to encourage involvement of private sectors. Regarding investing and financing, he said that to achieve private investment in infrastructure we need to foster the dialogue with the private sector. They must understand that infrastructure is not a cost but an investment, and data should be generated to show them the economic impact of disasters.



Pablo Reali emphasized that producers do not have a security fund. Although there are times when they earn a lot of money, they do not save for the future, so Uruguay lost millions of dollars because public funds had to be used.

Kaloghlian said that our region is affected by climate change although gas emission is not produced in our region; we have to bear the cost of a problem we do not create. This issue has to be included in the international arena: the cost of the environmental impact of development is currently bore by the less developed countries. Costs of adaptation to climate change should be paid by each actor.

Míguez said that we have to think that we are all living in the same planet. Global circulation of gases in one country should be bore by all.

Kaloghlian pointed out that risk is caused by threats as well as by economic, social and infrastructure vulnerability. We need to work on vulnerability first. He mentions that Principles say that there is lack of non-structural measures and lack of information systems.

Míguez commented on the fact that decision support system is not mentioned in the Principles, and that anticipation of the situation and an alternative source must be used. For example, in developed countries they can predict if an aquifer is going to dry out; some measures could also be taken in our countries. We are no using these measures efficiently. Not only the academic but also stakeholders and government must take action in an organized way.

Kaloghlian agreed, and said that in Argentina there is no hydrological network so, they do not have enough data in order to plan on infrastructure or a decision-making support system. Each country produces its own data, but data is not shared with other countries. In Argentina there are only twenty-one measuring points in real time. Being such a big country, the gap is really big

Míguez said that in Uruguay there is a ruler to measure the water level and there are not enough people that can make this measurement. Sensors should be used instead. It is big data; you cannot have only one person to make the measurement.

Silveira mentioned that a radar network in Argentina is under discussion, whereas in Uruguay there is an ongoing discussion on whether or not we should invest on **one** radar.

Regarding Investment for the maintenance and management of existing infrastructure, Kobiyama said that in Brazil there is consistent analysis of data and a good measuring system. However, investors want to build everything new. Investment funds must be allocated not only to construction but to maintenance to prevent malfunctioning of



facilities. There are lots of radars, but most of them are not working. They invest money on construction but not on maintenance.

Kaloghlian said that in Argentina they do not have information like Prof. Hiroki showed in the graph in his presentation. Without data it is almost impossible to plan something ahead, you do not know whether it is a matter of structure or maintenance.

Míguez asked if we would need a more precise meteorological forecast and Kobiyama answered that being Brazil such a very large country, the meteorological institute is not efficient enough.

Silveira observed that in Uruguay there is no responsible authority managing hydrological alerts, there is for meteorological alerts only.

Kaloghlian said that in Argentina there is an alerting system that sends notifications via WhatsApp or email. Also, in the case of big rivers such as Bermejo and Pilcomayo they have an international alerting system from other countries; for example, if an event that is happening in Bolivia is likely to have ripple effects in Argentina, Bolivia sends an alert so they can be prepared.

There is a basin organization and a Federal Water Council (COHIFEE), where all the basin organization get together. Míguez stressed that this should be done in Uruguay, we have these basin committees but they never get together.

Mazzeo highlighted that transboundary connection is very important, but said that also, connection among levels within a country is a critical issue. Basin committees are important to solve the fragmentation of the state. The state needs to work on the implementation and monitoring. In Brazil, Uruguay and Argentina the implementation and control of measures are important issues.

Kaloghlian said that water should not be politicized. They have cases where structure information is not built because of politic decisions. He also made a comment on the wording of Principle V.18 “Any surplus funds in the pledged assistance of emergency response should be effectively utilized for further disaster risk reduction to build more resilient societies” He understands that if funds are cut off to use in a different way there will not be a good reaction to the risk.

According to Míguez, the spirit of the Principle is that any surplus should be used for preventive measures and Mr. Okada agrees that it is important to make the most of the funding so it can be used in the future.

Kaloghlian, who was the moderator, summarized the discussion in the following conclusions:



## Conclusions of Discussion 1 - Group 2

- Nonstructural measures must be taken (it is not only about infrastructure investment)
- Private sector involvement: disaster risk reduction is not a cost but an investment. The private sector must share the risk reduction, and it is going to be also a beneficiary of the process, not only a cost.
- Involvement is not passive. Private sectors must not ask for public funding.
- Decision-making support system must be implemented
- Investment should be done on maintenance
- Transboundary cooperation and multilevel interaction local and government levels is needed
- Research development and policy must be improved (good information, new technologies, policies)
- Strengthening the accuracy of forecasting in flash flood, tornados
- Dissemination of information is imperative
- Threat reduction: work on vulnerability and in reducing emission, the cost otherwise will be high.
- Water security and ecosystem adaptation measures to climate change must be put in place to improve resilience.

## DISCUSSION 2 - OPERATIONALIZATION OF THE PRINCIPLES

### Group 1

Discussion on key factors that are important in the operationalization of the draft principles. Participants take the same place as in the previous discussion.

Belen Reyes emphasized the need to promote DRR research and share emerging findings with political and technical areas related to water disaster risk and climate change. Principles should be used in national and local legislation.

Pedro Rivero said that the law and current legislation must be used as much as possible. DRR should be an integral part of water plans and basin water resources plans. Promotion of workshop for decision makers is imperative. He mentioned that in Peru they have formulated the national plan for flood control.

Silvana Gaudioso pointed out that DRR must be included in the National Water Strategy. We need a global framework. There should be a regulatory framework that reflects the





principles and demands to local stakeholders or governments. It is advisable to link these strategies to other agreements, for example Sendai, and evaluation projects.

Micaela Suriano said that in her country there is a law and a National Plan to Reduce Disaster Risk, but the funds are insufficient.

Claudia Crosa said that involvement of the private sector, education and technology are key. The private sector can invest and make money on resilient infrastructure. It is a win-win process.

Silvana Alcoz suggested that every job and every school should give a course on first aids. Also, she said that financing agencies must include disaster-risk management as a key point in the evaluation project. Pilot projects must be implemented including all these principles and actors following the logic “learning by doing”.

The moderator summarized the discussion in the following conclusions:

#### Conclusions of Discussion 2 – Group 1

1. Engage private sector in win-win projects (for example PPP).
2. Promote DRR lines of research
3. Link the principles, strategies and action plans, with national and local legislation
4. Promote workshop for decisions makers.
5. Involve all actors. Education is key.
6. Science and technology are key too.
7. Make financing agencies and governments to include disaster risk as a key point in an evaluation project.
8. Implement pilot project that include all the principles and involve different actors. “Learning by doing”.

#### Group 2

Discussion on key factors that are important in the operationalization of the draft principles. Participants take the same place as in the previous discussion.

Tomoyuki Okada explained that they need to know how to use and share these principles with stakeholders in each country. They would like to promote these principles as soon as possible. In order to do that, they would need suggestions and recommendations and asked participants to comment on the difficulties mobilizing funding in their countries.



Néstor Mazzeo stated that a list of principles, independently of the problem and the strategies, is useful for decision making progress.

Regarding operationalization, Kobiyama said that Global Water Partnership in Brazil needs to organize meetings or workshops so people get to know this organization better.

Diana Míguez asked where can we get the funds. Countries do not have enough resources. *Should the private sector invest on this?*

Pablo Kaloghlian said that without a “story to tell” it would be difficult to leverage investment from the private sector. First, data must be processed to make it clear for investors that extension of countermeasures is necessary. Secondly, the story should be told in a participatory way. He explained that in Argentina, for example, they are starting to plan and inland channel to manage the excess and scarcity of water from Mid-North of Argentina to the Mid-South. They have noticed an increasing interest from the private sector. They had a meeting with the biggest producers in the country and they had a good response to the project. They even suggested that they would be willing to pay taxes to finance it. They saw it as an investment not as a cost because they understood that with this channel, they would also be able to improve navigation of goods.

Míguez, said that it is not about spending the money without return, on the contrary, there will be an investment to mitigate effects and impacts which will result in better profits.

Kaloghlian said that reconstruction in Argentina depends on most part from the civil society. Once the disaster happens, people build their own home. The State does not build their houses again. The worst problem is the lack of funds to build infrastructure projects to solve this problem.

Míguez mentioned that investors sometimes are uncertain on what to invest. People do not know how to divert the flow of the river, for example. That should be explained very clearly to them from a scientific perspective.

Kaloghlian emphasized that the creation of a prioritized portfolio with an interdisciplinary approach is necessary. This is an investment and the benefits must be showed. For producers, benefits are quite straightforward: more production less loss, but funds find it really hard to generate the financing infrastructure for investors. The Government must engage the private sector interest to mobilize green investment. They should be informed on what may happen if they invest, what will be the business benefits of addressing these issues, what are the outcomes of their investment. For



example, they should be explained that if they invest on infrastructure, there will not be floods, they will increase production; if they build a channel, they will be able to move production up and down the river, etc.

Míguez asked if there are any funding resources in Brazil, and Kobiyama explained that there is a science and technological funding. The Government needs to make people understand why public money must be invested on disaster reduction using the media, for example.

Pablo Reali said that TV news shows disasters as a catastrophe but do not use them effectively to explain how to prevent a disaster, what really happened, or the cause of it. They do not use the time for raising awareness.

Mazzeo said that if stakeholders do not know the cause of disasters, it is impossible to take action to prevent them. Development strategies depend on accumulation and disaster hinders the accumulation process. It is important to convince them of the consequences. Move from reaction to anticipation.

Míguez said that sometimes people do not know the cause of a disaster. So, the first press release shows the impact on the property and people lives. Later on, they would try finding the cause and people eventually forget about it. She agreed that more efforts should be made to make the media aware of the need to give relevant information to the people so they can secure measures to prevent loss of lives in a future natural disaster.

Okada said that many private companies in Japan still do not have business continuity against natural disasters, especially in Japan. Companies do not know how to prepare for a disaster or the risk of the company's location. They ask volunteer companies to build business continuity plans. They create guidelines and distribute them in seminars organized by business associations.

Mazzeo asked Okada about the last tsunami in Japan. He wanted to know if it is possible to determine contribution from the public sector and the private sector. Okada answered that it is difficult to measure. Reconstruction mainly was made by the Government although citizens built their own houses. It was a joint reconstruction process.

Mazzeo then asked if in that particular event Japan depended on international cooperation and Okada replied that they did not receive any international funding, but the government used the supplementary budget system to make money available. In addition, Government employees' salaries were reduced to cope with the national financial burden for recovery from the disaster.



Kaloghlian mentioned that it is imperative to create hazard maps to distribute among the people so everybody knows that there might be an earthquake, volcano, flood, etc.

Míguez said that we must define which would be the worst scenario first... what if... Before giving the map to the people, you must know what might happen.

Okada said that regarding risk, they design a target and then prepare a hazard map. They use a two-level disaster management system.

Kaloghlian indicated that in order to mitigate impact, a hazard map is imperative to create an evacuation plan. This information must be given to the civil society. Míguez said that it would be great to have a risk map with sensors. In the long run, they be the most explicit measurement method.

Silveira said that maps are useful for national authorities but people find them difficult to understand. In order to reduce disaster, we need to improve the hydrological forecast.

Kobiyama stated that before making a risk or hazard map, we need to implement a training course to technicians to elaborate these maps. Many maps are wrong, at least in Brazil.

Kaloghlian concluded that it is important to generate technical capacity and creating updating risk and hazard maps. Míguez added that vulnerability maps in case of aquifers should be updated.

Mazzeo said that, sometimes, the risk modification is not related to climate change but to land use transformation. A good idea would be to analyze hazards every 2 years. He also suggested the creation of an insurance system. If people know that they are located in a risky area, they may choose to spend money not in infrastructure but in insurance.

Pablo Reali said that the problem is that insurance companies do not cover meteorological hazards. Míguez said that there is crop insurance in case of hail.



## Conclusions of Discussion 2 – Group 2

- Principles are a guide for better practices. We should organize a meeting or booklet at country level for dissemination of these principles
- Interest in investing in ex-anti measures must be generated. Private sector involvement is key
- Structural and non-structural measures must be considered
- A prioritized portfolio should be created using a multidisciplinary approach. It must be focused on benefits and on regional development.
- Generate a “story to tell” to leverage interest.
- Development is an accumulative process and disaster disrupts this process: working on avoiding disaster will foster development
- Generate technical capacity and create reliable and updated hazard risk maps.

After moderators finished explaining each group’s conclusions, some participants started making comments, in particular highlighted the need for private investment.

Rivero stressed that it is not easy to involve the private sector in Peru and Kaloghlian agreed with him. However, he said that if we create an engaging financial mechanism for the private sector, we might be able to attract private investment. As an example, he mentioned that the creation of a channel in Argentina made financing feasible. When they first presented the project, producers were interested in protecting their crops only, but later they started to see it as a regional development and interest increased among investors. The possibility of moving the production through this channel turned this project into a multipurpose and multidisciplinary project. In Argentina lots of ideas came up to engage private financing. In his last example, land owners agreed to start thinking of paying a tax for this purpose.

Hiroki said that in Japan, as a result of the creation of infrastructure, the value of the land increased, and the industrial area in Japan got safer and more productive, however, it is still difficult to involve the private sector.

Crosa agreed that it is not easy, and that changing loss measurements is not easy either.

Kaloghlian emphasized that in order to promote investment, water should be not politicized.

Hiroki emphasized the importance of raising awareness to increase support. Reali agreed and commented on the bad use of the media. They do not make an efficient use of the time to raise awareness.



## DISCUSSION 3- WATER-RELATED DISASTER RISK REDUCTION – EXPERIENCE AND RESPONSE

### CASE STUDY 1 – Prof. Masato Kobiyama

Prof. Kobiyama presented a case study. In his presentation, which is included in Appendix 6, “Some problems of water-related risk reduction in Southern Brazil”, he first went over the geography of Brazil and explained that he was going to focus in the Eastern part of Brazil, where there is a great number of mountains and hillslopes. Along the coast of Brazil, the frequency of land slide is very high. There are also debris flow, dam break, drought and flows among other severe events.

He talked about the problems found in water-related risk reduction in Brazil and mentioned that slow action has been taken at federal government level.

1. Lack of a digital elevation model (DEM) construction for the entire country (a 1: 10,000 base)
2. Lack of rainfall gauge and discharge monitoring stations in Brazil. Especially for small catchments (< 50 km<sup>2</sup>) where flash floods are predominant.
3. Very slow action in early-warning system because of the federal government system (CEMADEN - Centro Nacional de Monitoramento e Alertas de Desastres Naturais). Need to have state or regional level centers for monitoring and alert system.
4. Lack of training courses on hydrology (hydrogeomorphology, hydrometeorology, hydrogeology, etc.) by universities and local communities for all the citizens. – Citizen science.
5. Lack of database (maps, historical records, monitoring data, etc.)

He finally made some suggestions for investment to reduce water-related disaster.

1. Creation of DEM with 1:10,000 (or 2 m) and its availability.
2. Construction of many monitoring stations of rainfall and discharge, especially for small catchments (< 50 km<sup>2</sup>).
3. Decentralization of the current systems of monitoring and alert (transfer from federal to state and municipal governments).
4. Providing training and education to strengthen and empower all citizens.
5. Construction of database and its availability

As  
final



considerations he stressed that the role of the citizens is important as well as hydrology education. Training courses and environmental education are required as well as the integration of universities with the government. Keeping history records is key.

## CASE STUDY 2 – Pedro Antonio Rivero

Pedro Rivero showed one institutional video of the National Water Authority of Peru (ANA) that is accessible following the link below.

[ANA's institutional video](#) outlined its main responsibilities in Peru. ANA's main role is to care for and protect the natural water resources in Peru, where there are 159 basins. It works to ensure water security and to maintain the availability of water. It also performs preventing actions to reduce the vulnerability of the population due to extreme events such as draught and floods like "El Niño" phenomenon. It promotes research, training and dissemination of adaptation measures to climate change and risk management.

## REGIONAL PROJECT PROPOSAL: Dr. Néstor Mazzeo.

Dr. Néstor Mazzeo, shared a presentation on a regional project proposal from [Saras Institute](#) "Progress of the aquatic ecosystems governance and challenges in South America", which is included in Appendix 7.

He explained that research and proposals were recently approved and that they involve three countries: Uruguay, Brazil and Argentina. GWP South America is also partner of this project.

The main purpose of his research was to analyze the strengths and weaknesses of the governance systems observed in Brazil and Uruguay, considering Sao Paulo water crisis and the drinking water supply crisis in the metropolitan region of Uruguay.

This study on the Sao Paulo water scarcity crisis is aimed to analyze if this critical event was only caused by climate change or if it was a combination of both natural causes and poor management.

Although the scarcity problem in Sao Paulo followed a scenario of reduced rainfall in the southeastern region of Brazil, there were other factors that contributed to the crisis, such as the increase of urban areas in the metropolitan region and its impacts on recharge of surface and groundwater systems, unplanned occupation of key reservoir margins, deterioration of the water quality of several crucial reservoirs of the water supply system and structural problems of the management system.

With regards to Uruguay water quality crisis, he said that the main reservoirs show eutrophic conditions and recurrent blooms of cyanobacteria with cyanotoxins productions. This water

quality  
crisis is



due to the interaction of important transformations of land use, climatic variability and the inefficiency of management systems

The case of Uruguay is the typical example of fragmented and uncoordinated management. He explained that in our system the performance of the basin commissions in Uruguay represents an important advance, promoting the coordination of institutions located at different levels (national, departmental, and municipal), and the interaction with users and the different interests of society. However, the main problem is the inertia found in the institutions that are responsible for the implementation, control and monitoring of the agreed measures and strategies defined in the basin commissions and other bridge structures recently created. Strategies and measures designed by these basin committees are not duly enforced.

A substantial part of the inertia and difficulties in the transition between command-control and integrated management is supported by most part of the university education of the actors involved in the management system. He also explained that University education is built on reductionism and there is little formation in systems theory, complex and dynamic systems and resilient thinking.

Regarding whether scientists have adequate training and an attractive incentive scheme of academic evaluation to make relevant transformations of water management, the answer is No.

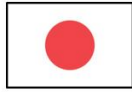
He finally talked about the IAI transdisciplinary project (Transforming water governance in South America: from reaction to adaptation and anticipation) which was recently approved. The main objectives of this study are:

- To analyze the water supply/scarcity crisis in South America by studying scientific literature, news media, social networks and the responses of the governance and learning processes associated.
- Evaluate the capacities of adaptation, resilience and anticipation in a set of study systems on which the team is already working, in Argentina, Brazil and Uruguay.
- Identify and explain how dialogue, multiple disciplinary knowledge and domains (knowledge types, thinking logics, worldviews) are useful to co-create new knowledge and make decisions.
- Contribute to the governance of water in the region, with emphasis on decision-making process, participation and legitimacy, based on the strengthening of anticipatory capacities, the articulation of knowledge, the promotion of experimentation and associated social learning mechanisms.

Rivero made some comments to Mazzeo with regards to the IAI Interdisciplinary Project. He said he wished his country had been involved in this project. He invited Mazzeo and his collaborators to visit ANA in Peru. Mazzeo answered that he would be delighted to come and that one of his collaborators had mentioned that Peru has made outstanding progress in water management.



Mazzeo



explained that in Uruguay people from political science mention that there is a deconcentration process. We have a lot of challenges and problems. We are far away from adaptation management.

He reaffirmed that the main objective of his research is trying to understand if in the case of Argentina, Brazil and Uruguay the crisis promotes a real transformation of the governance system. Also, to analyze when this big transformation occurs. We must determine if water crisis is a key driver of this transformation or not, and identify barriers for transformation. A critical event is an opportunity for learning.

Okada asked him if when he talks about the system, he is referring to the institutional system. Mazzeo explained that he is referring to the interaction of the knowledge system with the academic system, and the people involved in management, policy design and stakeholders.

Hiroki wanted to know how these findings could impact local participants. Mazzeo explained that the methodology of this proposal works in the basin committee of Laguna del Sauce in Uruguay, Sao Paulo in Brazil and Chubut River in Argentina. He said that their project is intended not to predict the conditions in the future scenario, but to know which will be the scenario that the people would like to build in the future.

## CLOSING REMARKS

Prof. Hiroki thanked the participants for this event and said that he learned a lot about regional aspects of the water-related issues from discussion, videos and presentations. He hoped our countries can benefit from a future collaboration with Japan.

## VISIT TO THE TECHNOLOGICAL LABORATORY OF URUGUAY

Participants were highly appreciative of a visit to LATU. Mr. Daniel Volpe, Manager of Analysis, Testing and Metrology, welcomed and guided the workshop participants to module 5, which holds the chromatography method development, contaminants residues, trace analysis of metals, and water and environmental assessment departments.



## PHOTO GALLERY











## APPENDICES



## APPENDIX 1 Workshop Program

Time	Session description	Method of facilitation	Responsible
08:30-09:00	Participant registration		All
09:00-09:10	<ul style="list-style-type: none"> <li>Opening Remarks</li> </ul>		Mrs. Alejandra Mujica GWP South America Regional Coordinator
09:10-09:20	<ul style="list-style-type: none"> <li>Welcome Address</li> </ul>		Prof Kenzo Hiroki Professor, GRIPS Coordinator HELP, Japan
09:20-09:30	<ul style="list-style-type: none"> <li>Facilitated self-introduction of participants</li> </ul>		GWP South America
09:30-10:00	<ul style="list-style-type: none"> <li>Overview of Water-related disaster and approaches in South America: Regional perspective</li> </ul>		Mrs. Alejandra Mujica
10:00-10:45	<p><b>Introduction to HELP draft Principles</b></p> <ul style="list-style-type: none"> <li>Presentation by HELP representative to explain the purpose, expectations and contents of the draft Principles on Investment and Financing for Water-related Disaster Risk Reduction (15min)</li> <li>Fill in survey form (30min)               <ul style="list-style-type: none"> <li>-Messages from stakeholders to HELP</li> <li>-Modification to the Principles</li> <li>-Perception about disaster response</li> </ul> </li> </ul>	Survey along with the draft principles will be sent before the workshop by GWP South America. Participants will have 30 minutes to complete the survey at the workshop and ask any questions to clarify.	Mr. Tomoyuki Okada Director for International Coordination of River Engineering, MLIT, Japan
10:45-11:00	<b>Coffee Break</b>		



11:00-12:15	<p><b>Discussion 1: On Principles</b></p> <ul style="list-style-type: none"> <li>• <i>Session introduction</i></li> <li>• <i>Interactive table discussions on the Principles</i> -Messages from stakeholders to HELP -Modification to the Principles</li> <li>• <i>Plenary discussion of contributions and messages</i></li> <li>• <i>Prioritization of key messages</i></li> </ul>	<p>Discussion of Principle; messages to the HELP on what in the Principles should be added, dropped, kept. Participants gather around roundtables. First participants individually come up with suggestions and then discuss at the table to come up with the 3-4 most important messages from the table. After about 20-25 minutes the facilitator asks each table for one message. After going around the room once, the facilitator opens to any table to add messages. The messages are recorded on wall chart and numbered by a rapporteur as they come out. The results are discussed among all.</p>	<p>Introduction to format of discussion: Mr. Tomoyuki Okada  GWP/HELP facilitators</p>
12:15-13:30	<b>Lunch</b>		
13:30-14:30	<p><b>Discussion 2: Operationalization of the principles</b></p> <ul style="list-style-type: none"> <li>• <i>Session introduction</i></li> <li>• <i>Interactive table discussions on the application/operationalization of principles:</i> -Messages from stakeholders to HELP on application of principles</li> <li>• <i>Plenary discussion of contributions and messages</i></li> <li>• <i>Prioritization of key messages</i></li> </ul>	<p>Discussion of key factors that are important in the operationalization of the draft principles, as well as any other aspects that are concern from the 'field'. Participants gather around tables of around 5 people each. First participants individually come up with suggestions and then discuss at the table to come up with the 3-4 most important messages from the table. After about 20-25 minutes the facilitator asks each table for one message. After going around the room once, the facilitator opens to any table to add messages. The messages are recorded on wall chart and numbered by rapporteur as they come out. The results are discussed among all.</p>	<p>GWP/HELP facilitators</p>
14:30-15:30	<p><b>Plenary discussion: Feedback on Draft Principles</b></p>		<p>Prof. Kenzo Hiroki</p>
15:30-15:50	<b>Coffee Break</b>		





15:50-16:50	<p><b>Discussion 3: Water-related disaster risk reduction – experiences and response</b></p> <ul style="list-style-type: none"> <li>• <i>Presentation of case studies from countries or the region on water-related disasters and water-related disaster risk reduction</i></li> <li>• Presentation of regional project proposal</li> <li>• <i>Discussion</i></li> </ul>	Presentations followed by plenary discussion	<p>Case studies: Masato Kobiyama, University of Rio Grande do Sul Pedro Guerrero, ANA Perú</p> <p>- Regional project proposal (Néstor Mazzeo, SARAs Institute)</p> <p>- Discussion moderated by GWP/HELP Facilitators</p>
16:50-17:10	<p><b>Summary of findings</b></p>	HELP and GWP facilitators summarize the findings from the discussions. Participants are invited to provide overall feedback.	GWP/HELP Facilitators and Rapporteur
17:10-17:30	<p><b>Final plenary discussion and closing remarks</b></p>		Prof. Kenzo Hiroki

After meeting	<p><b>Dinner at Restaurant</b> Transport will be provided for foreign participants</p>
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## APPENDIX 2

### Proposed Principles

#### **Draft Principles on Investment and Financing for Water-related Disaster Risk Reduction**

by

High-level Experts and Leaders Panel on Water and Disasters (HELP)

**Double the investments and financing for water-related disaster risk reduction with a focus on disaster risk reduction/preparedness, so that the proportion of financing in international assistance for disaster risk reduction/preparedness and that for emergency response/rehabilitation will shift from the current 10%:90% to 90%:10%.**

- Globally, direct economic losses caused by disasters are significantly increasing, and the number of people affected by disasters is on the rise. The direct damages of disasters alone over the past 10 years amount to about 1.4 trillion US dollars. Water-related disasters account for almost 90% of the world's top 1,000 disasters.
- The importance of increasing investments and financing for disaster risk reduction is now widely recognized in international agreements, such as the Sendai Framework for Disaster Risk Reduction. However, about 90% of the international assistance is directed for emergency response and reconstruction/rehabilitation, while the amount disbursed for disaster prevention and preparedness is limited to only 10%.

#### **I. Water-related disaster risk reduction is indispensable for socio-economic development**

1. Water-related disasters caused by extreme water-related events can be prevented or mitigated by developing disaster prevention infrastructure ahead of the disaster events. These measures can include construction of levees and reservoirs, development of resilient infrastructure, utilization of innovative green infrastructure, or issuing timely early warnings.
2. Countermeasures implemented in advance to mitigate water-related disasters are not a cost, but an investment for the socioeconomic development of the future.
3. Water-related disaster risk reduction is a key component of Integrated Water Resources Management (IWRM), and should be promoted through participation of water users and to yield multi-faceted benefits, such as efficient water use and enhanced biodiversity. Unevenly distributed water, both temporally and spatially, can be effectively managed by an integrated systems approach.



## **II. Ex-ante measures of water-related disaster risk reduction should be prioritized**

4. Relatively frequent water-related disasters should be forestalled mainly by implementing preventive structural measures at lower cost than the amount spent for recovery.
5. Countermeasures against large-scale and less frequent water-related disasters should also be implemented in order to avoid devastating damages to the society and economy, while putting the highest priority on protecting human lives.
6. A “Build Back Better” approach should be incorporated into the recovery and reconstruction process so as to improve the resilience of communities and prevent recurrent damages from similar disasters.
7. Various sectors support “mainstreaming disaster risk reduction,” including urban development. Land use management can effectively prevent the increase of runoff discharge and consequently contribute to water-related disaster risk reduction.
8. Investment needs to be enhanced for adaptation measures to climate change, which is projected to increase the frequency and scale of water-related disaster damage.
9. Investment for the maintenance and management of existing infrastructure should be secured to prevent malfunction of facilities and the devastating damages caused by deteriorated infrastructure.

## **III. Governments should improve their fiscal systems and allocate sufficient budget for water-related disaster risk reduction**

10. Governments must prepare the legal, budgetary and administrative systems for water-related disaster risk reduction. The central government should prepare support and financial assistance systems for disaster-hit local governments in case a large-scale disaster exceeds local capacity.
11. It is crucial to define the roles and responsibilities of all stakeholders, including residents, local governments and the central government, and to empower the local governments and communities.
12. Budget for ex-ante disaster risk reduction should be secured at local level as well as at national level, considering the circumstances and frequency of natural disasters. That budget data should be recorded and made traceable.
13. An emergency reserve fund, if secured as a portion of the annual budget, can be swiftly disbursed after disasters in disaster-prone countries.

## **IV. Various funding sources for water-related risk reduction should be mobilized**

14. Mobilization of private funds can support increasing demand for resilient infrastructure. Implementation of countermeasures for water-related disasters in conjunction with other sectors, such as water resources management and urban planning, helps diversify funding sources.
15. Incentives for awareness raising and self-prevention measures by the private sector should be explored, through subsidies and tax exemptions for instance.



16. Flood insurance is effective for the speedy recovery of daily life from disasters. However, it should be noted that the insurance does not physically reduce flood risks.

**V. The international community should expand financing for water-related disaster risk reduction**

17. International cooperation in disaster prevention should be strengthened under the international frameworks, because disaster damages in a single country have ripple effects to the world, for example through supply chain disruptions. Therefore, the international community should focus more on investments for disaster risk reduction over recovery and reconstruction.
18. Any surplus funds in the pledged assistance of emergency response should be effectively utilized for further disaster risk reduction to build more resilient societies.

**VI. Financing for science and technology should be strengthened to support sound investment decisions**

19. Data and knowledge on the losses and impacts of water-related disasters should be improved to evaluate the effectiveness of investment and facilitate better investment decisions.
20. Cooperation and alliances among science communities should be enhanced to develop and apply science and technology to disaster risk reduction.



## APPENDIX 3

### Questionnaire on Water-related Disaster Risk Reduction by HELP and GRIPS

#### **Questionnaire on Water-related Disaster Risk Reduction By High-level Experts and Leaders Panel on Water and Disasters (HELP) and National Graduate Institute for Policy Study (GRIPS)**

Objective of this questionnaire survey is to know opinions of experts and stakeholders on various aspects of water-related disaster risk reduction (DRR) in countries to improve actions on water-related DRR. The survey result will be used only for this study objectives including one to improve Principles on Investment and Financing for Water-related DRR. Answers will be statistically processed and privacy of answerers will be strictly protected.

#### **Part 1 General questions on disasters**

Q 1.1 Please specify the name of your country: ( )

Q 1.2 To what disasters do you think your country is vulnerable?

- Heavy rain;  Flood;  Land slide/Mud flow;  Strong wind/Tornado;
- Typhoon/Hurricane;  Drought;  Earthquake;  Tsunami;  Volcanic eruption;
- Forest fire;  Heat wave;  Snow/Avalanche;  Extreme cold temperature;
- Others (specify here: )

Q 1.3 What mega-disasters (i.e. disasters causing deaths of ten or more and/or involving substantial impact on national/regional economy) happened in your country in the past 70 years?

- Heavy rain;  Flood;  Land slide/Mud flow;  Strong wind/Tornado;
- Typhoon/Hurricane;  Drought;  Earthquake;  Tsunami;  Volcanic eruption;
- Forest fire;  Heat wave;  Snow/Avalanche;  Extreme cold temperature;
- Others (specify here: )

Q 1.4 What levels do you think your country is generally prepared for water-related disasters?

- Generally safe to water-related disaster events that may happen once every year
- Generally safe to water-related disaster events that may happen once in 5-10 years
- Generally safe to water-related disaster events that may happen once in 30-50 years
- Generally safe to water-related disaster events that may happen once in 100 or more years

Q 1.5 Do you think that disaster risk reduction is a top priority issue of governments of your country?



strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 1.6 Do you think that priority on disaster risk reduction by your government has been increased recently?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 1.7 Why the priority of government has changed  higher  lower?

Because frequency of disasters have increased;  Because there was a large scale disaster recently in country;  Because of disasters that happened in the world;  Because leaders have mentioned/addressed DRR issues more;  Because general public are more aware of disaster threats;  Because of climate change issue;  Other reasons (specify here: \_\_\_\_\_)

## **Part 2 Financing and investment in water-related DRR**

### **Part 2.1 Questions on the Principles**

Q 2.1 Do you agree that current level of financing and investment is enough to sustainably ensure water-related disaster risk reduction in your country?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 2.2 Do you agree that financing and investment in DRR in your country should be at least doubled in your country?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 2.2.2 Do you agree that financing and investment in Water-related DRR in your country should be at least doubled in your country?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 2.3 Do you agree that water-related disasters caused by extreme water phenomena can be prevented or mitigated by developing disaster prevention infrastructure ahead of time?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 2.4 Do you agree that water-related disaster risk reduction should be a key component of Integrated Water Resources Management?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know



Q 2.5 Do you agree that “Build Back Better” approach should be incorporated into the recovery and reconstruction work of large scale water-related disasters so as to improve the resilience of the community and prevent further disasters?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 2.6 Do you agree that investments should be made to secure the maintenance and management of existing infrastructure in order to prevent the loss of functionality and devastating damage that comes with deterioration in infrastructure?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 2.7 Do you agree that flood insurance does not physically reduce the risk of flood damage, so it does not lead to improvements in the resilience of society?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 2.8 Do you agree that any surplus in the pledged emergency response aid should be made available for disaster prevention/disaster risk reduction to create a more resilient society?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 2.9 Do you agree that cooperation and alliances among science communities should be enhanced in order to promote development and application of science and technology on water-related disaster risk reduction?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

## **Part 2.2 Promoting financing and investment in water-related DRR in your country**

Q 2.10 What are main sources of financing in disaster risk reduction in your country?

Budget of central government;  Budget of local government;  Foreign assistance;  
 Private investment;  Investment by philanthropic organizations/NGOs;  Public bond;  Fees and tariffs;  Contribution by communities

Q 2.11 For what do you think your country should invest more in water-related disaster risk reduction?

Early warning;  DRR infrastructure (dykes, diversion, etc.);  IWRM infrastructure (multi-purpose dams, dual use of pumps and canals, etc.);  Retrofitting existing structures/buildings against water-related disasters;  Education and training of citizens;



R&D on DRR;  Dissemination of information (hazard maps, etc.);  Insurance against water-related disasters;  Others (specify here: \_\_\_\_\_)

Q 2.12 What measures will be effective in increasing financing and investment in water-related DRR?

Raising awareness of national leaders;  Lobbying for parliamentarians and legislators;  
 Creating international solidarity to lobby for the needs of DRR investment;  Local campaign for the needs of DRR;  Dialogue with financiers and investors;  Discussion with multilateral development banks on DRR investment;  Promoting private sectors to spend more for DRR;  Others (specify here: \_\_\_\_\_)

Q 2.13 Please describe here your suggestions to improve financing and investment on water-related disaster risk reduction and/or your opinions and comments on the Principles if any:

**Part 3 Public support to national leaders/government as a result of their DRR actions**

Q 3.1 Do you agree that disaster management is prime responsibility of national political leaders (i.e. presidents and heads of states)?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 3.2 Do you think that success and failure of disaster management affect support rate (popularity rate) to leaders?

strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 3.3 Have you seen newspaper/media articles in which leaders/governments were appreciated/criticized for managing specific disasters in your country?

Yes;  No

Q 3.4 What were subjects of appreciation/criticism? Please note that you can check both fast and slow actions in different disaster cases.

Provision of disaster information (hazard maps, etc.) to citizens before disaster happens





- Fast early warning to citizens
- Fast establishment of disaster management headquarters
- Fast dispatch of response of rescue teams
- Sufficient provision of relief goods
- Sufficient provision of shelters
- Fast recovery of public services (electricity, gas, water)
- Fast reopening of traffic (roads and/or railways)
- Fast response of government to disaster situation
- Provision of monetary grants to affected people
- Provision of special care to vulnerable people (e.g. seniors, handicapped people, infants and children)
- Provision of disaster insurance

#### Q3.5.1

Do you agree that public support to governments can be even increased if large-scale disasters are managed well by the governments?

- strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 3.5.2 Do you agree that public support to governments decreases when the followings happen?

- Effective infrastructure on DRR (dykes, diversion, etc.) were not existent in the disaster areas  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Early warnings have not been issued to citizens at all  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Early warnings have not been issued to citizens swiftly enough  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Government declared national emergency status because of disaster  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Government appealed for international assistance for disaster relief/reconstruction  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Central disaster management headquarters have not been established swiftly enough  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Disaster damage information have not been announced swiftly enough  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know



- Disaster information materials (hazard maps, etc.) to citizens have not been provided to citizens before disaster happens  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Provision of relief materials to affected people were delayed/confused  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Reconstruction of disaster affected areas have not progressed appropriately  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Providing sufficient budget/fund to preparedness/prevention activities of disasters  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Disaster caused major damage/failure to public infrastructure, which led to further economic/human loss  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Disaster has resulted in a large number of human loss irrespective of whatever government did for DRR  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Disaster has resulted in a large number of economic loss irrespective of whatever government did for DRR  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know
- Disaster has resulted in much smaller damage/loss than previous ones thanks to better preparedness of government  
 strongly agree;  agree;  neutral;  disagree;  strongly disagree;  I don't know

Q 3.6 Please describe here your suggestions on increasing social support regarding water-related disaster risk reduction and/or any other opinions and comments:



#### Part 4 Miscellaneous

Q 4.1 Your gender:  Male;  Female

Q 4.2 Your age group:  under 20;  20-29;  30-39;  40-49;  50-59;  60-69;  
 70-

Q 4.3 Your profession:  Lawyer;  Administrator;  Engineer/Technical expert;  
 Researcher;  Teacher;  Consultant;  Business manager/clerk;  
 Other (specify \_\_\_\_\_)

Q 4.4 Your organization:  Central/Federal government;  Local government;  University;

Research institution;  the UN;  International organization;  Donor/Development financial institution;  NGO/Civil Society organization;  Union;  Independent consultant;  Other (specify \_\_\_\_\_)

Q 4.4.2 Name of your organization: ( \_\_\_\_\_ )

Q 4.5 Your position in the organization

Head of organization  Manager  Advisor  Staff Member  Expert  Professor;  Researcher  Lawyer  Accountant

Q4.5.2 Name of your designation: ( \_\_\_\_\_ )

Q 4.5.3 Your area of expertise:  Disaster management;  Water Supply;  Sanitation and hygiene;  Hydrology;  Meteorology;  Climate Change;  Irrigation;  Water resources management;  Agriculture; Administration;  Engineering;  Economics;

Law;  Environment/Ecology;  Other ( \_\_\_\_\_ )

Q 4.6 Are you a GWP member?

Yes;  No

Thank you very much for taking your precious time to answer the questions.



APPENDIX 4 –  
Overview of Water-related disaster and approaches in South America: Regional  
perspective. Alejandra Mujica



## Overview of Water-related disaster and approaches in South America: Regional perspective

### HELP-GWP consultation meeting

April 23, 2010 Montevideo – Uruguay  
Alejandra Mujica, GWP South America



## Development of Latin America

- LATAM and the **Sustainable Development Goals**
- Natural disasters as **barriers** to development
- Thousands of **deaths**, millions of **people affected**, billions of **dollars invested.....(I do not have the estimated figures)**
- **POVERTY AND INEQUITY** (I have no doubt that it has been increasing)



## Development of Latin America

### FINANCING

- response to the emergency
- reconstruction

VERSUS

- PREVENTION DISASTER
- PREPAREDNESS



## Development of Latin America



**NATURAL DISASTERS**

**SOCIAL FENOMENA**

**natural??  
social??**



## Development of Latin America

- ❖ RISK MANAGEMENT
- ❖ VULNERABILITY
- ❖ NO COUNTRY IS OUTSIDE OF THESE FENOMENA

Thank you!



## APPENDIX 5

Global and Asian Challenges on Water-related Disasters and  
Position of Principles on Investment and Financing for Water-related Disaster  
Risk Reduction Prof. Kenzo Hiroki





# **Global and Asian Challenges on Water-related Disasters And Position of “Principles on Investment and Financing for Water-related Disaster Risk Reduction”**

**Kenzo Hiroki**

**Professor, National Graduate Institute for Policy Studies (GRIPS)  
Coordinator, High-level Experts and Leaders Panel on Water and  
Disasters (HELP)**



# Why Water and Disasters?



# **Glimpse of a water-related disaster, March 11<sup>th</sup>, 2011**

*Viewed from Kamaishi City Hall*



# Why Water and Disasters?

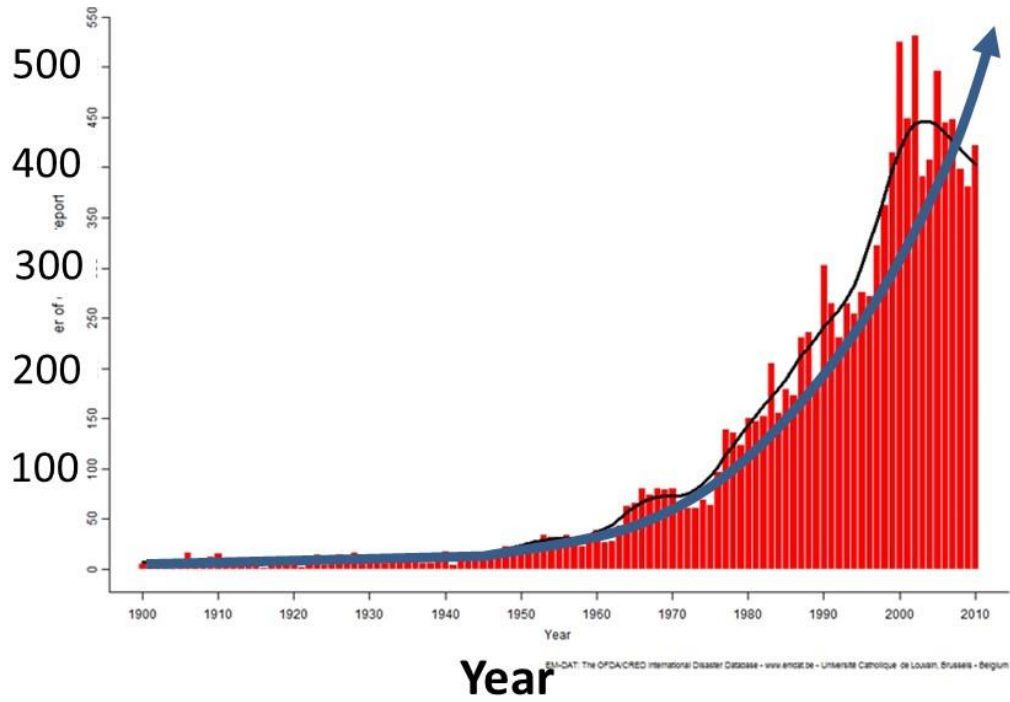
**We should not repeat the Tragedy  
for our family, people, and nation**



# **Disasters are increasing in numbers and impacts**



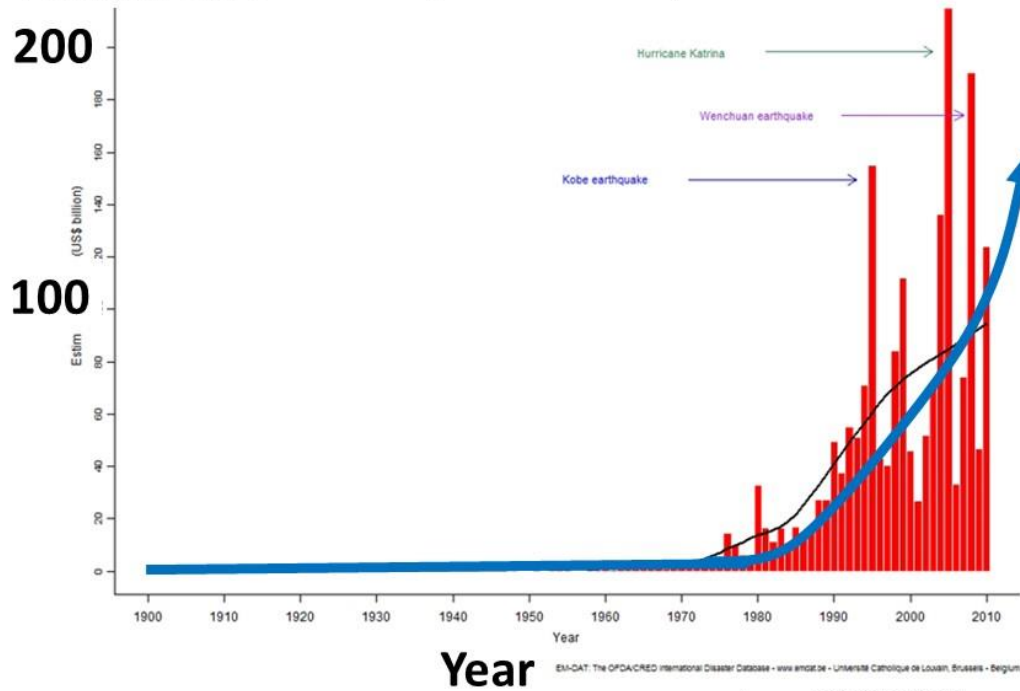
## Number of reported natural disasters(1900-2010)



Source: ISDR "EM-DAT"

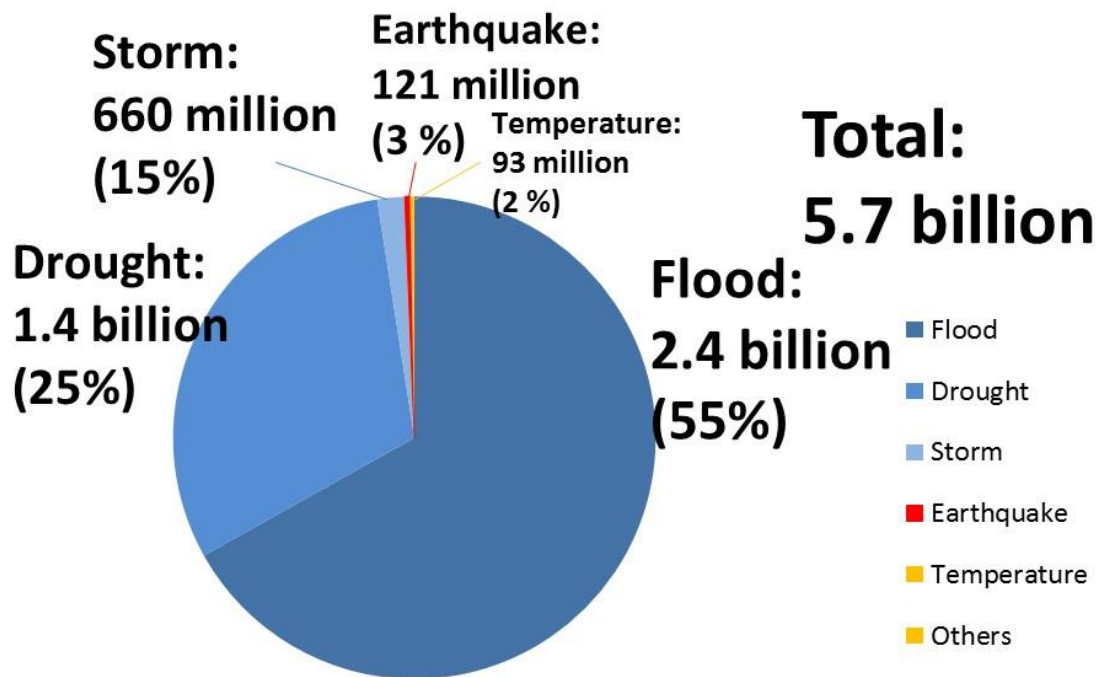


## Estimated damage caused by natural disasters Billion USD (1900-2010)





## Number of people affected by disasters (1994-2013)

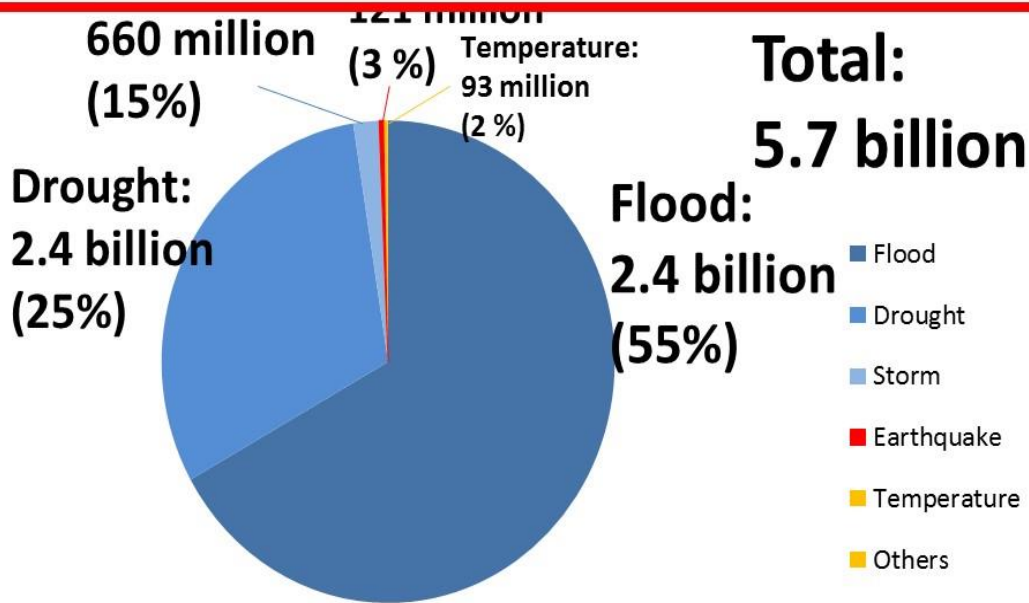


Source: CRED "The human cost of natural disasters 2015"





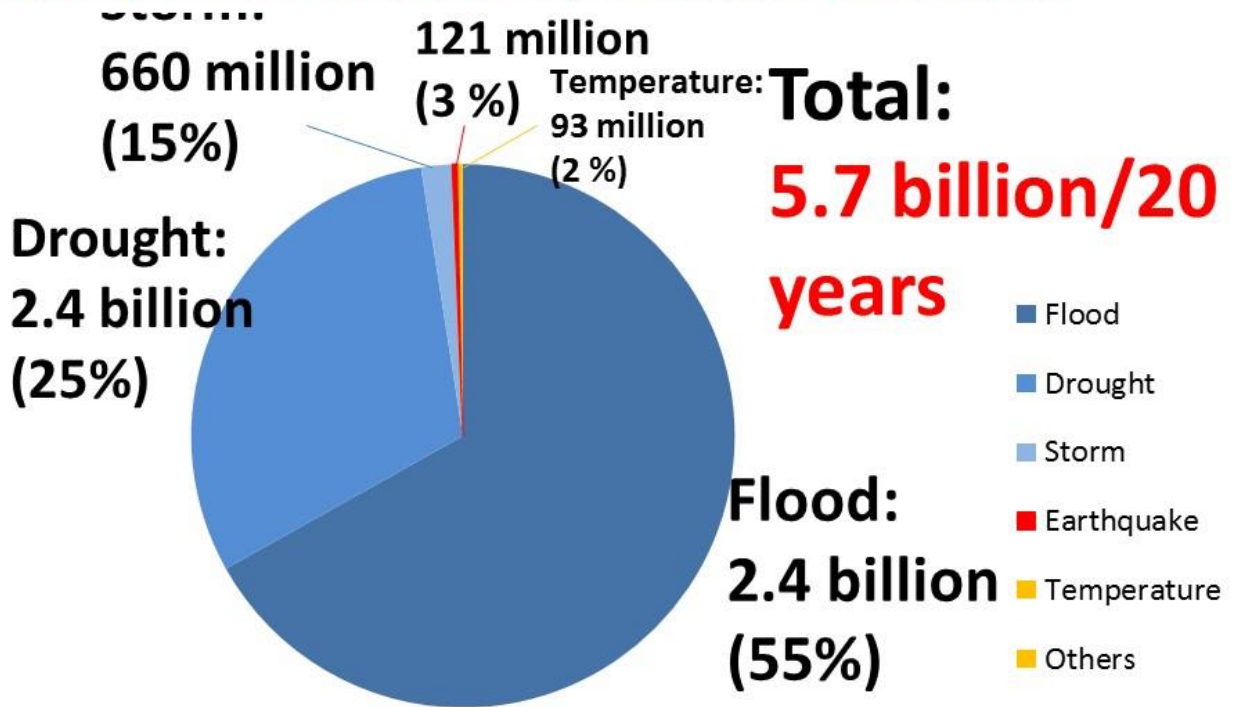
# 95% of disasters are water-related disasters



Source: CRED "The human cost of natural disasters 2015"



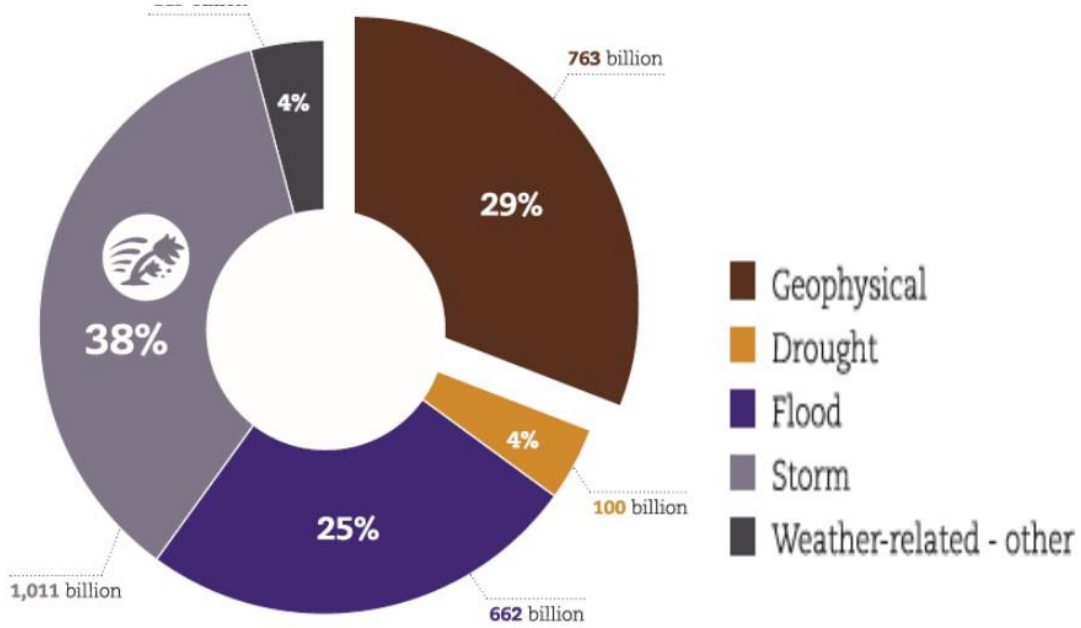
**Anybody on earth will be hit by disasters twice in his/her life time on average, mostly by water-related disasters, sometimes fatal.**



Source: CRED "The human cost of natural disasters 2015"



The world has **lost 2.7 trillion USD** in 20 years (1995-2015) by disasters. **70 % of the loss by water-related disasters**

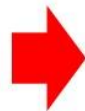
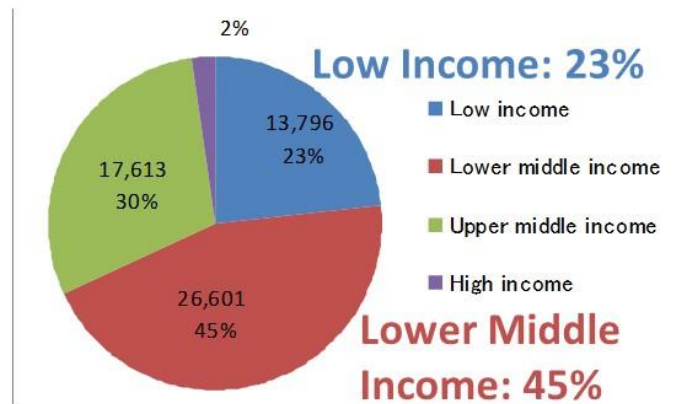




**“Water and Disasters” is strongly linked to poverty issue**



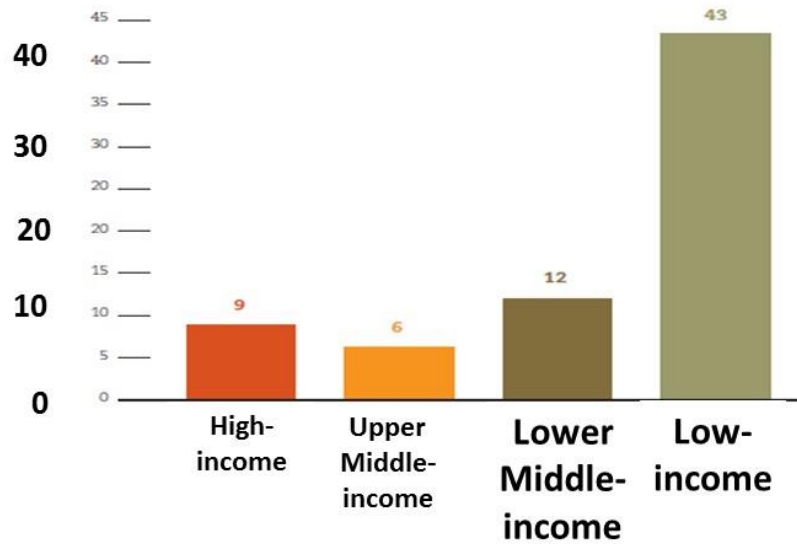
## Number of fatalities by floods (2001- - 70 % of human loss by flooding are from “low income” or “lower middle income” countries -



**Water and disasters are strongly  
linked to poverty issues**



## Number of disaster deaths per one million inhabitants by income groups (1994-2013)





# **Principles on Investment and Financing for Water-related Disaster Risk Reduction**



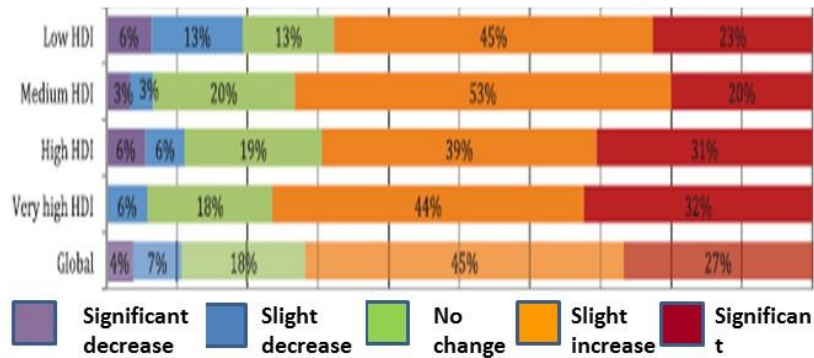
# **Response of Global Community to Ever-increasing Disasters and Their Impacts**





## Disaster management is gaining importance within governments

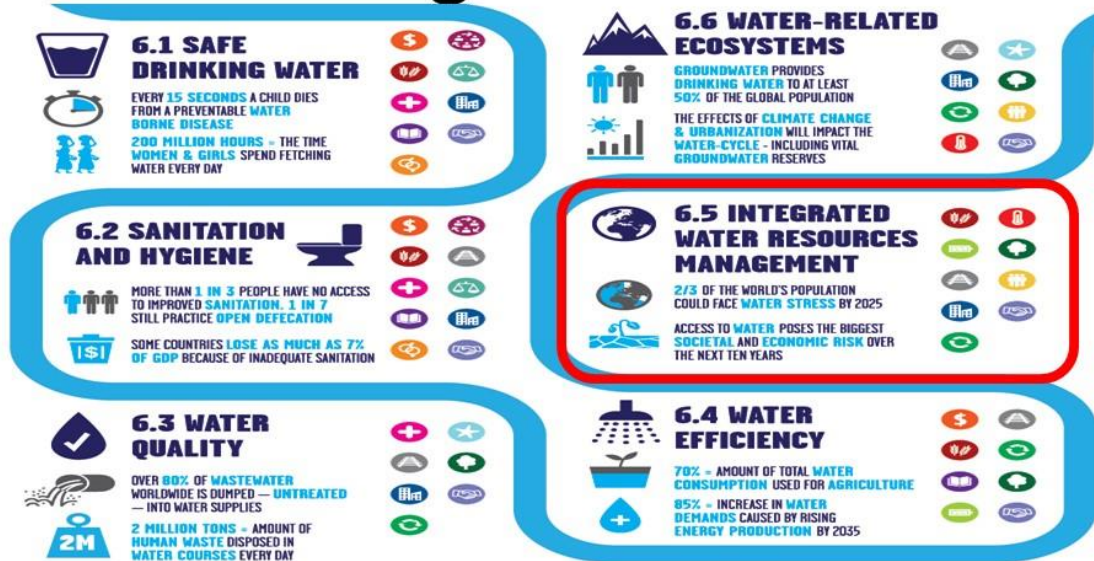
Perceived change in the importance of disaster management over the past 20 years



**70% of countries think disasters have become more important among the government priorities**



# Six Targets of SDG6



- ✓ Comprehensive goals and targets on water
- ✓ The targets are related to other development agenda such as health, food, education, and gender
- ✓ Each of Targets has indicator(s) and monitoring agencies



## **Four Priorities for Action of Sendai Framework**

- 1. Understanding disaster risk.**
- 2. Strengthening disaster risk governance to manage disaster risk.**
- 3. Investing in disaster risk reduction for resilience.**
- 4. Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction.**



## **Principles on Investment and Financing for Water-related Disaster Risk Reduction**

### **Background**


- **“Investing in disaster risk reduction for resilience” as one of the four priority actions in the Sendai Framework**
- **“By 2030, significantly reduce ...substantially decrease the direct economic losses caused by disasters, including water-related disasters...” as SDG Target 11.5**
- **“We commit to promote disaster risk reduction and management, through supporting the development of disaster risk reduction strategies and periodical assessments of disaster including standards for risk levels (HABITAT III)**



**High Level Panel on Water (HLPW)**  
convened by UN Secretary-General and President of  
the World Bank Group



# High Level Panel on Water (HLPW) *Special Advisor*



**Kevin Rutte**  
*Prime Minister, Netherlands*

**János Áder**  
*President, Hungary*

**Emomalii Rahmonov**  
*President, Tajikistan*

**Dr. Han Seung-soo**  
*Former Prime Minister, Republic of Korea*

**Macky Sall**  
*President, Senegal*

**Enrique Peña Nieto**  
*President, Mexico*

**Abdullah Ensour**  
*Prime Minister, Jordan*

**Ameenah Gurib-Fakim**  
*President, Mauritius*

**Sheikh Hasina**  
*Prime Minister, Bangladesh*

**Pedro Kuczynski**  
*President, Peru*

**Jacob Zuma**  
*President, South Africa*

**Malcolm Turnbull, PM**  
*Australia*

**Co-chairs**

**Co-convened by:**

**Antonio Guterres**  
*UN Secretary-General*

**WORLD BANK**

**Jim Yong Kim**  
*President, World Bank Group*

**UNITED NATIONS**



## HLPW Action Plan “9 Areas of Action”

1. Catalyzing Changes, Building Partnerships and International Cooperation
2. Resilient Economies, Societies, and Disaster Risk Reduction
3. Universal Access to Safe Water and Sanitation
4. Sustainable Cities and Human Settlements
5. Water and the Environment
6. Infrastructure and Investments
7. Water Governance
8. Water Data
9. Valuing Water





## Recommendations on Disaster Risk Reduction in HLPW Outcome Document

### HEADLINE RECOMMENDATION

**Shift focus of disaster management from  
response to preparedness and resilience**

### DETAILED RECOMMENDATIONS

- **Financing for and investment in water-related DRR and resilience should be doubled within the next five years.**
- **“Principles on Investment and Financing” should be used to make effective use of this increased investment and could help increasing investments in countries.**

24





## Challenges “the Principle” need to address

- Sometimes the biggest hurdle is convincing the government to decide and commit to financing infrastructure (USACE)
- Risk prevention should be integrated with long-term planning and create opportunities for synergies with planned investments (Netherlands)
- Investment for “disaster prevention” needs to be strengthened for protection of economic development gains and consistent progress of the economic growth. (Japan)
- There is a need for long term financing strategies to improve resilience ...particularly at the national government level. (OECD)
- It is also important to look into innovative financing. Insurance industry is least developed in developing countries. (UNESCAP)
- Organizations such as donors will need to increase the amount of investment. (KOICA)
- Disaster risk reduction is not merely a cost, but an investment for stronger development which pays off in the future. (JICA)

25



## Objectives of the Principle

- **Build convincing arguments and logics (e.g. addressed to Finance Ministry) that disaster risk reduction pays off**
- **Establish standardized methodology to analyze cost of water-related disasters, particularly indirect cost**
- **Create portfolio of innovative/alternative financing for water-related disaster risk reduction**
- **Promote identifying and sharing good practices on financing and investing in water-related DRR**
- **Recommend legal/administrative/budgetary system that ensures long-term financial flow for DRR investment**
- **Recommend strategies to make the above to happen in countries**

26



## Chronology towards Finalization of the Principles

2015-2018 Global Community prioritizes financing DRR (SDGs, Sendai, Habitat III)

Mar. 15 HLPW recommended creation of the Principles

**May 3 Announcing Draft Principle in the 12<sup>th</sup> HELP Meeting, Geneva**

Aug. 26 Global Consultation Meeting I on the Principles in Stockholm WWW

Oct. 9 1<sup>st</sup> Regional Consultation Workshop on the Principles in Central and Eastern Europe in Bucharest, Romania

Oct. 12 2<sup>nd</sup> Regional Consultation Workshop on the Principles in South West Asia, in Colombo, Sri Lanka

Nov. 1 3<sup>rd</sup> Regional Consultation Workshop on the Principles in Africa in Livingstone, Zambia

2019

Feb. 28 Global Consultation Meeting II in OECD, Paris

**Mar. 22 4<sup>th</sup> Regional Workshop on the Principles in Hanoi, Vietnam**

Apr. 18 Global Consultation Meeting III in the Hague, the Netherlands

Apr. 23 5<sup>th</sup> Regional Consultation Workshop in Montevideo, Uruguay

**June 24 Launching the Principles in the 4<sup>th</sup> UN Special Thematic Session on Water and Disasters in UN-HQs, New York**

July- Operationalizing the Principles in the World



**Thank you**



## APPENDIX 6

Some problems of water-related risk reduction in Southern Brazil. Prof. Masato Kobiyama



Montevideo, Uruguay, 23 April 2019  
**HELP-GWP consultation meeting on  
Draft Principles on Investment and Financing  
for Water-related Disaster Risk Reduction**



## Some problems of water-related disaster risk reduction in (southern) Brazil

**Prof. Masato Kobiyama**

Natural Disasters Research Group (GPDEN)

Hydraulic Research Institute (IPH)

Federal University of Rio Grande do Sul (UFRGS), Brazil





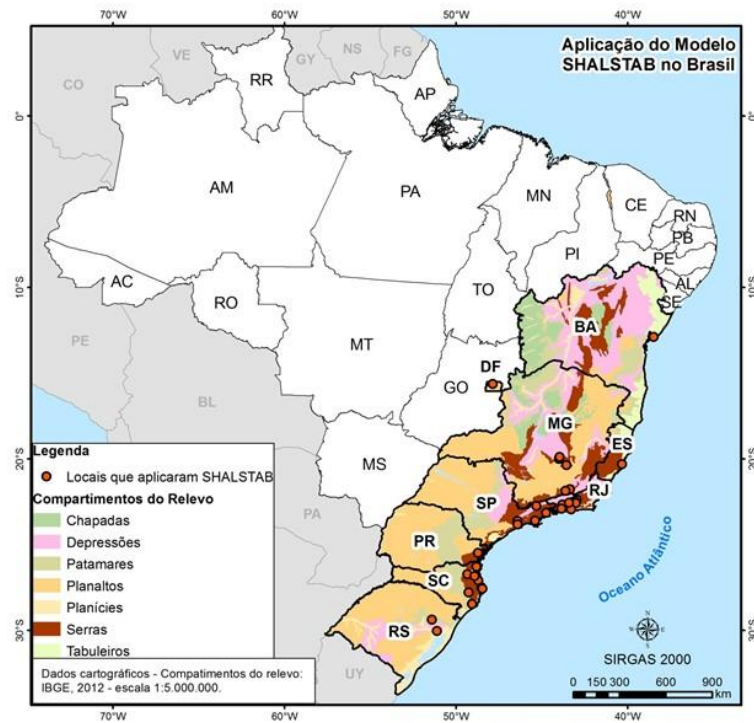
# Presentation

1. Geography in (southern) Brazil
2. Encountered problems in water-related risk reduction
3. Suggestions for investment to reduce water-related disaster
4. Final considerations

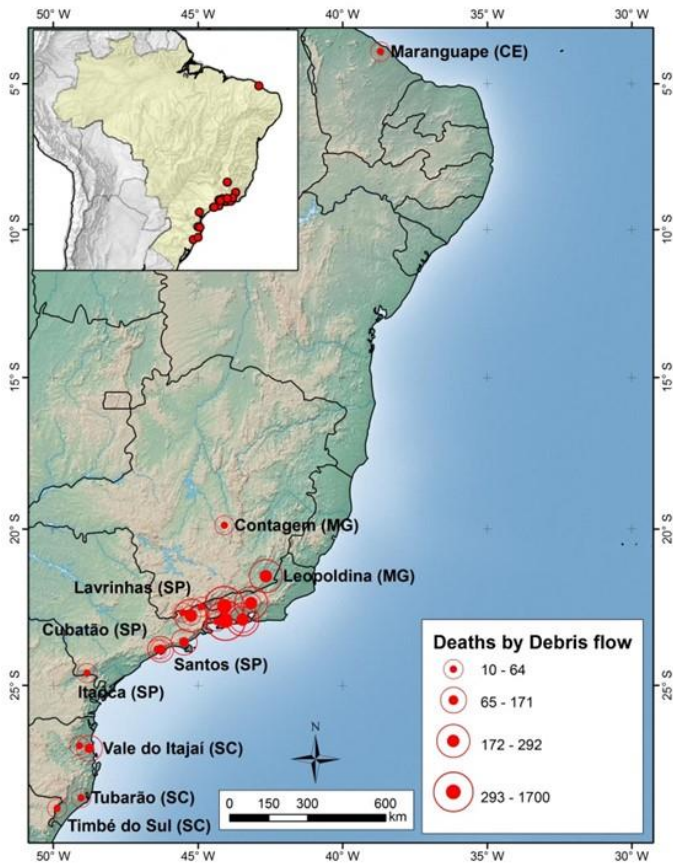








Locations of SHALSTAB application in Brazil (Melo & Kobiyama, 2018)



Locations of **large** disasters with debris flows in Brazil during the period 1900-2014 (Kobiyama et al., 2019)





Flood



Flash flood



Landslide



Debris flow



Dam break

**Typical water-related disasters in southern Brazil**



Drought



Storm



Thunderstorm

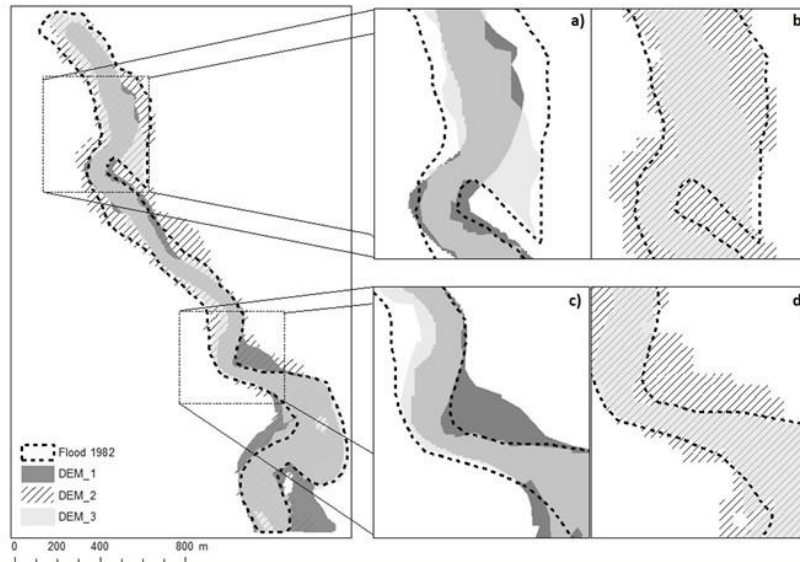


## 2. Encountered problems in water-related risk reduction

1. Lack of a digital elevation model (DEM) construction for the entire country (a 1: 10,000 base)
2. Lack of rainfall gauge and discharge monitoring stations in Brazil. Especially for small catchments (< 50 km<sup>2</sup>) where flash floods are predominant.
3. Very slow action in early-warning system because of the federal government system (CEMADEN - Centro Nacional de Monitoramento e Alertas de Desastres Naturais). Need to have state or regional level centers for monitoring and alert system.
4. Lack of training courses on hydrology (hydrogeomorphology, hydrometeorology, hydrogeology, etc.) by universities and local communities for all the citizens. – Citizen science.
5. Lack of database (maps, historical records, monitoring data, etc.)



## 2.1. Digital Elevation Model - DEM



Observed and simulated flood areas by CAESAR-Lisflood in São Vendelino municipality in Brazil. Note that (a) and (c) compare the observed area to the simulated areas with DEM\_1 and DEM\_2; and (b) and (d) compare the observed area to the simulated areas with DEM\_2 e DEM\_3. (Zambrano et al., submitted)



	<b>ESCALA</b>	<b>RESOLUÇÃO ESPACIAL</b>
	1:1.000.000	200 m
	1:750.000	150 m
	1:500.000	100 m
	1:450.000	90 m
	1:400.000	80 m
	1:350.000	70 m
	1:300.000	60 m
	1:250.000	50 m
	1:200.000	40 m
	1:150.000	30 m
	1:125.000	25 m
	1:100.000	20 m
	1:75.000	15 m
<b>Common scale in Brazil</b> →	1:50.000	10 m
	1:30.000	6 m
	1:25.000	5 m
	1:20.000	4 m
	1:15.000	3 m
<b>Desired scale in Brazil</b> →	1:10.000	2 m
<b>Common scale in Japan</b> →	1:5.000	1 m
	1:2.500	0,5 m



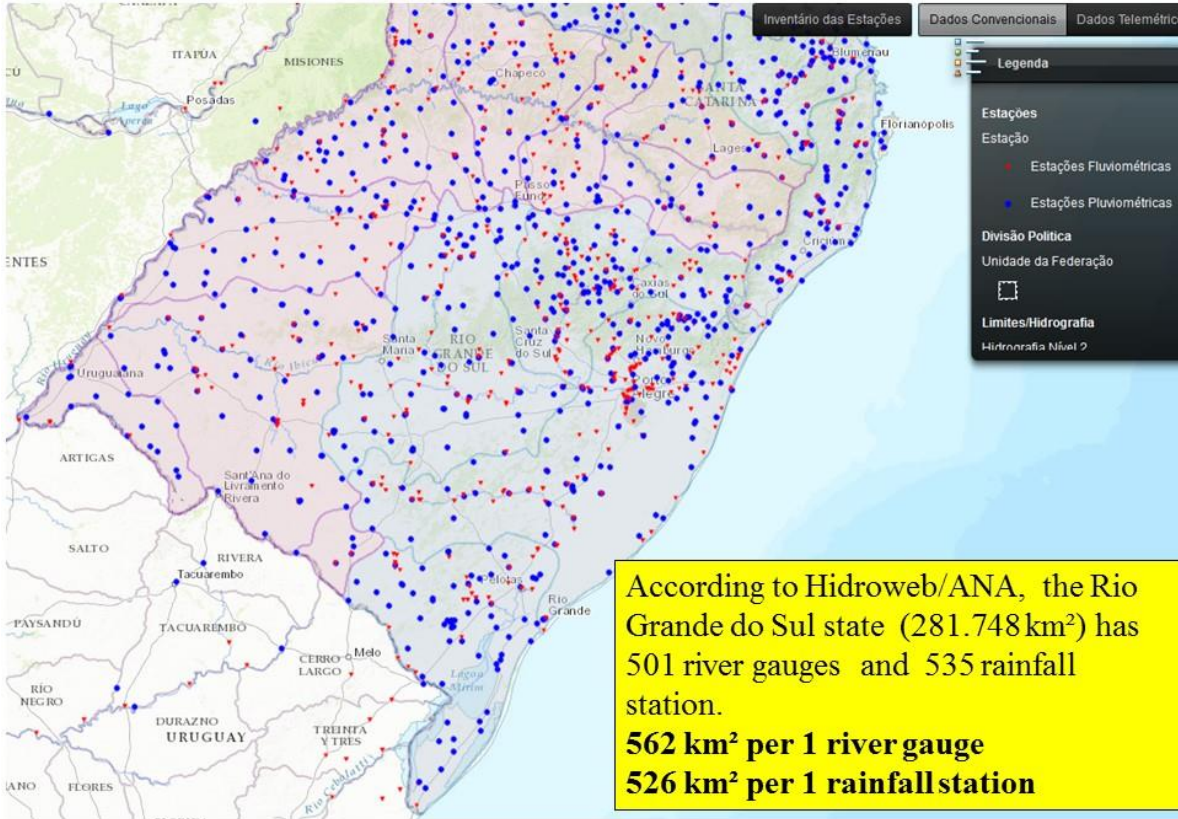
## 2.2. Monitoring system

Monitoring Purpose	Drainage area (km <sup>2</sup> )				
	0 -500	501-5000	5001-50000	50,001-500,000	>500,000
Rainfall	1	3	4	6	7
Lake	1	1	1	1	1
River	1	3	4	6	7
Sediment	1	2	2	3	3

**ANA-ANEEL Joint Resolution No. 3 (2010)**

**Recommended minimum densities of stations (area in km<sup>2</sup> per station) by WMO (2008)**

<i>Physiographic unit</i>	<i>Precipitation</i>	
	<i>Non-recording</i>	<i>Recording</i>
Coastal	900	9000
Mountains	250	2500
Interior plains	575	5750
Hilly/undulating	575	5750
Small islands	25	250
Urban areas	–	10–20
Polar/arid	10000	100000

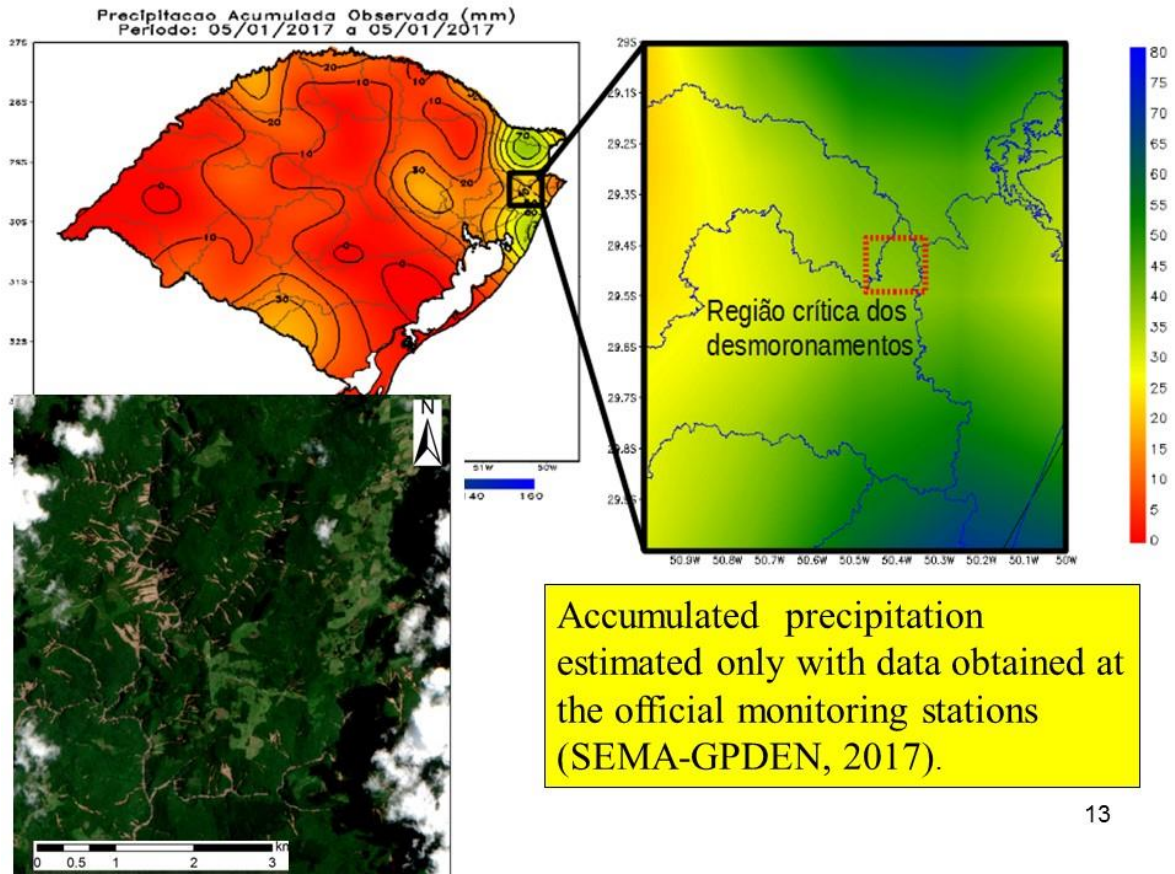


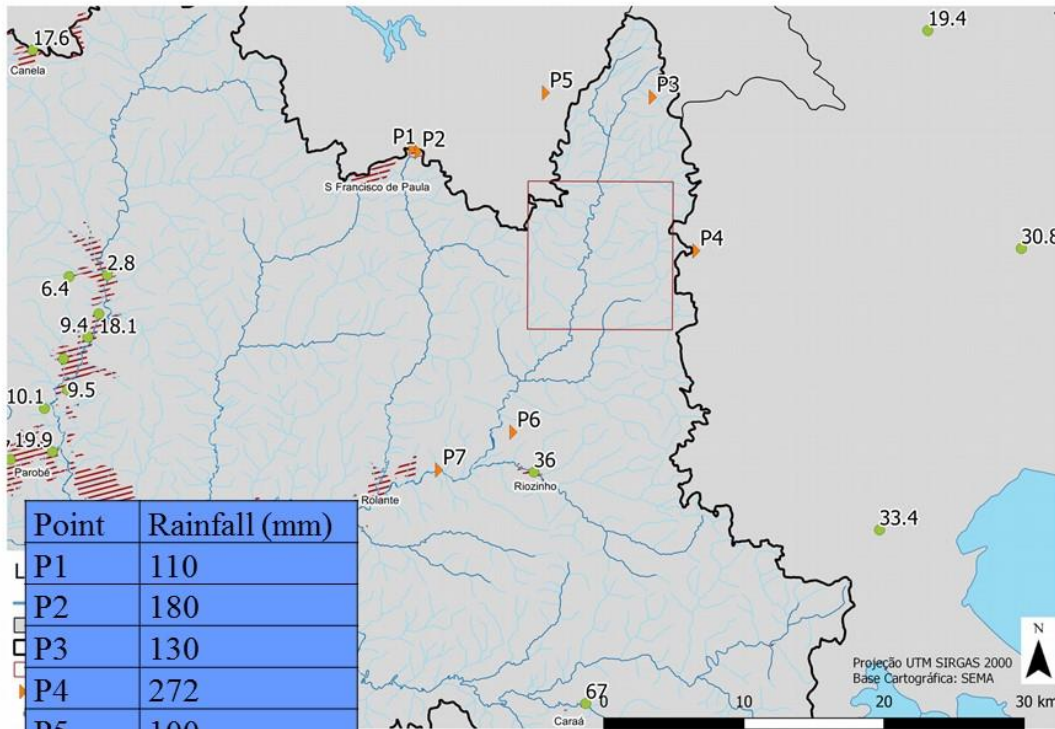




Rolante/RS in January 2017







Point	Rainfall (mm)
P1	110
P2	180
P3	130
P4	272
P5	100
P6	90
P7	96

official monitoring station (rain in mm) and of measuring points by farmers (SEMA-GPDEN, 2017).



P1



P2



P3



P5



P6



P7



It is very difficult and complicated to carry out scientific studies and preventive measures for reducing hydrological disasters with the actual number of rainfall gauge and discharge stations.

A citizen science is strongly desired!





### 2.3. Slow action at federal government level

CENAD (Centro Nacional de Gerenciamento de Riscos e Desastres)

CEMADEN (Centro Nacional de Monitoramento e Alertas de Desastres Naturais)





For (slow) floods, the current system with CEMADEN + CENAD can be useful. But for flash floods and debris flows, the current system does not work well because of its slowness.



The **decentralization** of the current system is required.  
Transfer to state governments, municipalities or committees of river basins.



## 2.4. Lack of training courses and environmental education

**Principle:** Each citizen has to save his life.



The training courses and environmental education are required.



**Science and technology for all the citizens  
(Citizen science establishment)**

Integration of universities with governments, Civil Protection, schools, etc.





## 2.5. Data-base (maps, registers, history, etc.)

The quantity of data of

[	floods occurrences	]
	landslides occurrences	
	rainfall	
	discharge	
	damages	
	etc.	

is not so much.

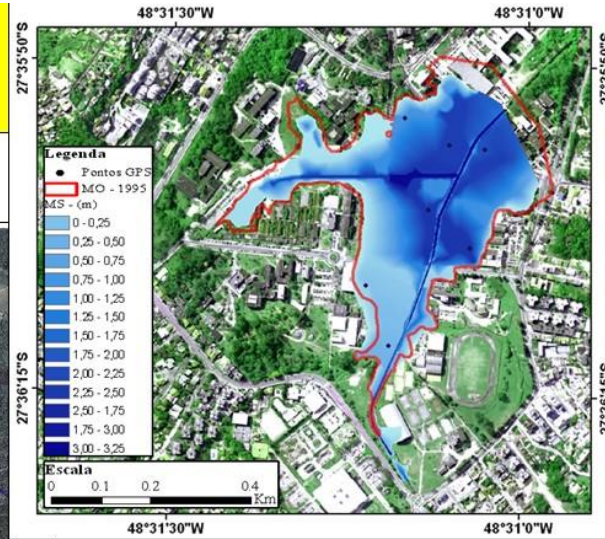
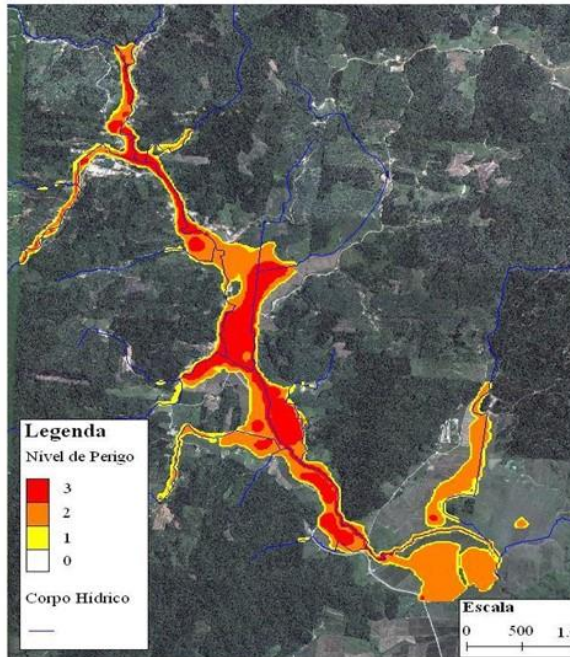
We do not have much information to discuss the landscape evolution.



It is difficult to calibrate and validate the landscape evolution models and climate change models.



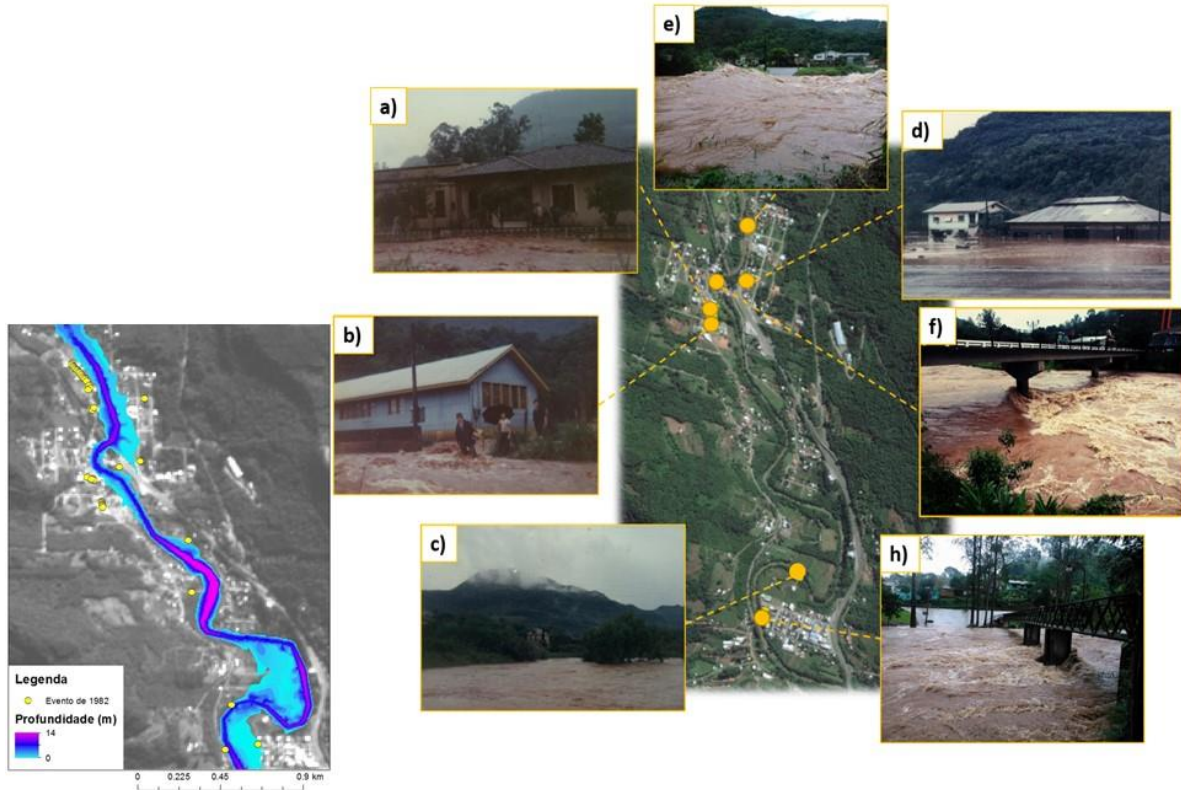
1995-Flood area observed in 2009 and simulated with HEC-RAS, in UFSC campus catchment (Florianópolis – SC)



2008-Flood area simulated with Flo-2D, in Baú region (Ilhota – SC)



## Records of flood in 1982 and 2015





### 3. Suggestions for investment to reduce water-related disaster

1. Creation of DEM with 1:10,000 (or 2 m) and its availability.
- ② Construction of many monitoring stations of rainfall and discharge, especially for small catchments (< 50 km<sup>2</sup>).
- ③ Decentralization of the current systems of monitoring and alert (transfer from federal to state and municipal governments).
- ④ Providing training and education to strengthen and empower all citizens.
- ⑤ Construction of database and its availability

Important role of citizens

Necessity to improve human resources

**Citizen Science  
establishment**

23



#### 4. Final considerations

- Importance of education to all the citizens.
- Importance of citizen science.
- Importance of history (registers)

**Water education (Hydrology education) –  
6<sup>th</sup> theme of IHP-VIII Phase (Water Security)**





**Thank you very much!**

Masato Kobiyama –

[masato.kobiyama@ufrgs.br](mailto:masato.kobiyama@ufrgs.br)

Grupo de Pesquisa de Desastres Naturais  
(GPDEN) – [www.ufrgs.br/gpden](http://www.ufrgs.br/gpden)





## APPENDIX 7

### Progress of the Aquatic Ecosystems' Governance and Challenges in South America, Dr. Néstor Mazzeo



## PROGRESS OF THE AQUATIC ECOSYSTEMS GOVERNANCE AND CHALLENGES IN SOUTH AMERICA

**Néstor Mazzeo<sup>1,2</sup>, Pedro Jacobi<sup>3</sup>, Cristina Zurbriggen<sup>4</sup>, María Mancilla<sup>5</sup>, Guillermo Goyenola<sup>1</sup>, Paula Bianchi<sup>2</sup>, Micaela Trimble<sup>2</sup> y Manfred Steffen<sup>2</sup>**

1 CURE-Facultad de Ciencias, Universidad de la República, Maldonado-Uruguay

2 Instituto SARAS2, Maldonado-Uruguay

3 Universidad de Sao Paulo; Brasil

4 Facultad de Ciencias Sociales, Universidad de la República, Uruguay

5 Stockholm Resilience Center, Sweden

Email: mazzeobeyhaut@yahoo.com



1. Development of the main paradigms of water resources management
2. Focus
3. Lessons from two water crisis: Sao Paulo and metropolitan area of Uruguay
4. Challenges
5. Do scientists have adequate training and an attractive incentive scheme of academic evaluation to make relevant transformations of water resources management?
6. IAI Proposal



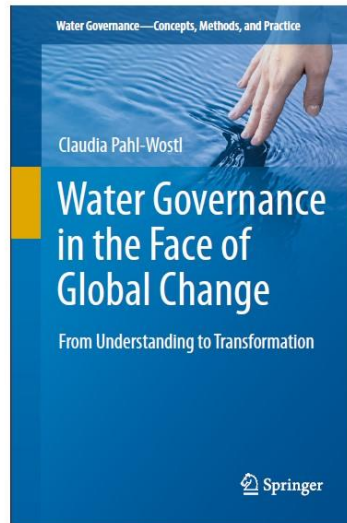


## DEVELOPMENT OF THE MAIN PARADIGMS



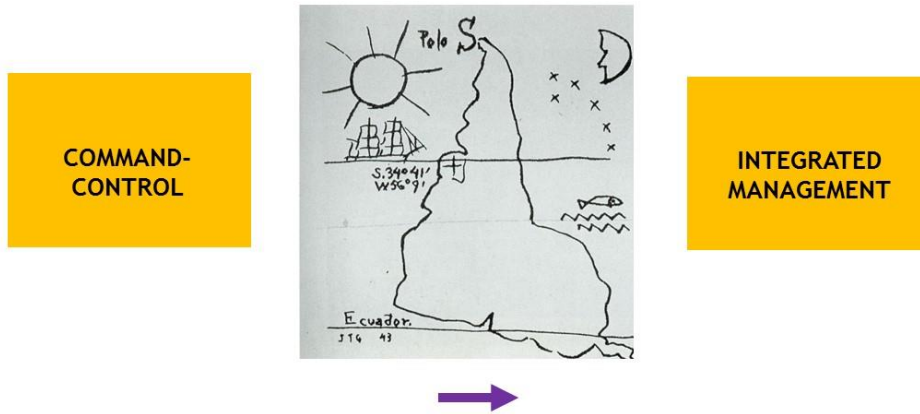
Overcome the fragmentation in the analysis and decision-making processes

Incorporate and properly handle uncertainty and promote the social learning





## LATIN AMERICA TRANSITION



## FOCUS

The purpose of this talk is to analyze the strengths and weaknesses of the governance systems observed in Brazil and Uruguay, considering the main lessons learned from two crisis: Sao Paulo water crisis and the drinking water supply in the metropolitan region of Uruguay.

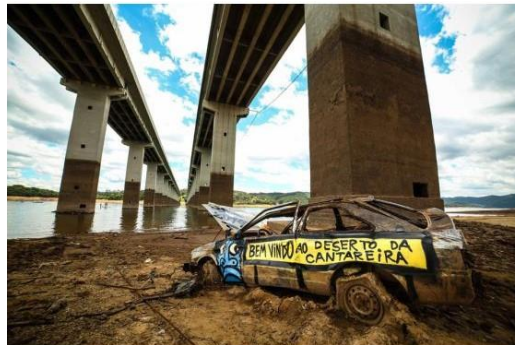


## FOCUS

From the lessons learned I want to explore: what are the current contribution and roles of the Limnologists in the governance system and if they have real capacities to promote substantial transformations.

## WATER CRISIS IN SAO PAULO

Is the São Paulo crisis a study case promoted exclusively by the climate variability, is it a management crisis or an interaction between both factors?





## WATER CRISIS IN SAO PAULO

- + The water crisis in São Paulo clearly follows a scenario of reduced rainfall in the southeastern region of Brazil in the period 2011-2015.
- + However, other drivers or pressures interacted simultaneously.



## WATER CRISIS IN SAO PAULO

- + The increase of urban areas in the metropolitan region and its impacts on recharge of surface and groundwater systems.
- + Unplanned occupation of key reservoir margins.
- + Deterioration of the water quality of several crucial reservoirs of the water supply system.
- + Structural problems of the management system (Jacobi et al. 2012; Souza, 2015).





## WATER CRISIS IN SAO PAULO

+ Brazil is a regional example of the transitions between command-control and integrated management observed in various regions of the planet.

+ In the case of San Pablo, the transition tried to overcome the fragmented, centralized management, organized according to political-administrative scales and in the hands of a state technocracy, controlled almost exclusively by the interests of the electricity sector (Souza Jr. and Fidelman 2009).



## WATER CRISIS IN SAO PAULO

+ Unfortunately, the new institutional arrangement of the 1990s failed to establish negotiation and collaboration spaces, with little participation in the new bridges institutions (basin committees) (Jacobi et al., 2015).

+ At the moment, it is not possible to consolidate a system of integrated management of water resources according with their full potential and transition to adaptive management appear very distant in time.





## WATER CRISIS IN SAO PAULO

- + Crucial message: changes in the structure of the systems do not guarantee, by themselves, the fulfillment of the objectives or goals.
- + The characteristics and skills of the actors are as relevant or more than the structure of the management system.



## DRINKING WATER SUPPLY IN THE METROPOLITAN REGION OF URUGUAY

- + The main reservoirs show eutrophic conditions and recurrent blooms of cyanobacteria with cyanotoxins productions (Mazzeo et al. 2015).
- + The water quality crisis is due to the interaction of important transformations of land use, climatic variability and the inefficiency of management systems.





## DRINKING WATER SUPPLY IN THE METROPOLITAN REGION OF URUGUAY

+ The transition between command-control and integrated management occurred through a constitutional reform approved by a referendum in 2004, the last referendum approved by popular vote.



## DRINKING WATER SUPPLY IN THE METROPOLITAN REGION OF URUGUAY

+ The creation of the watershed commissions and other bridge structures foreseen in the referendum and the Water Policy of 2009, began to be implemented in 2010.





## DRINKING WATER SUPPLY IN THE METROPOLITAN REGION OF URUGUAY

+ The performance of the basin commissions in Uruguay represents an important advance, creating formal spaces for the coordination and complementation of a constellation of institutions located at different levels (national, departmental, and municipal), and also promotes the interaction with users and the different interests of society.



## DRINKING WATER SUPPLY IN THE METROPOLITAN REGION OF URUGUAY

+ The agreements reached in the bridge institutions are not binding and the control of implementation is social.







## DRINKING WATER SUPPLY IN THE METROPOLITAN REGION OF URUGUAY



+ The main difficulty is the significant inertia found in the institutional structure directly responsible for the implementation, control and monitoring of the agreed measures and strategies defined in the basin commissions and other bridge structures recently created.



## CHALLENGES FOR ACADEMIC SECTOR

+ A substantial part of the inertia and difficulties in the transition between command-control and integrated management is supported by the university education of the actors (the majority) involved in the management system.

+ University education is built on reductionism and a very weak formation in systems theory, complex and dynamic systems and resilient thinking.





We live on an island of knowledge surrounded by a sea of ignorance. As our island of knowledge grows, so does the shore of our ignorance.  
John A. Wheeler, Scientific American (1992).



.....the world has problems, universities have departments (Brewer 1999) and the States have Ministers (Terra, 2015).



**Do scientists have adequate training and an attractive incentive scheme of academic evaluation to make relevant transformations of water management?**

**Transforming water governance in South America: from reaction to adaptation and anticipation**

**IAI TRANSDISCIPLINARY PROJECT**



1. To analyze the water supply/scarcity crisis in South America (scientific literature, news media, social networks) and the responses of the governance and learning processes associated.
2. Evaluate the capacities of adaptation, resilience (adaptation + transformation) and anticipation in a set of study systems on which the team is already working, in Argentina, Brazil and Uruguay.
3. Identify and explain how dialogue, or not, multiple disciplinary knowledge and domains (knowledge types, thinking logics, worldviews) to co-create new knowledge, to make decisions, how the future is used.
  
4. Contribute to the governance of water in the region, with emphasis on decision-making process, participation and legitimacy, based on the strengthening of anticipatory capacities, the articulation of knowledge, the promotion of experimentation and associated social learning mechanisms.

