Water Futures and Solutions: World Water Scenarios Initiative

LAUNCH MEETING

4-5 February 2013, Laxenburg, Austria

REPORT

International Institute for Applied Systems Analysis
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SUMMARY

- The "Water Futures and Solutions: World Water Scenarios Initiative" (WFaS) was launched on 4-5 February 2013 at the International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria. Some 80 participants from a broad range of institutions attended the launch meeting, including senior representatives from government and non-government organizations, the business sector and academia.

- The launch meeting provided a platform to formulate needs and priority areas for global water governance. Participants discussed the initiative and explored opportunities to participate in it. An agreement was reached on a shared vision to develop a stakeholder-driven set of global water scenarios that are consistent with recent global efforts on energy and climate change and explore robust solutions for managing water under different future development pathways.

- The five-year initiative will serve as a mechanism of change to stimulate thinking and action on water management globally. A new generation of global, regional and country-based water scenarios will be developed with an explicit emphasis on technological, institutional, financial and socio-economic solutions to address current and future water demands across all sectors. The multi-model assessments will increase the robustness of policy responses and the effectiveness of solutions to manage water efficiently.

- The initiative will build on IIASA's Applied Systems Analysis approach, which has enabled groundbreaking assessments such as the Global Energy Assessment, as well as the accomplishments of UNESCO through the World Water Assessment Programme. It will make use of ongoing scenario work with the Shared Socioeconomic Pathways (SSPs) that are being developed in the context of the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report (AR5).

- The contributions from participants will guide further development of the initiative. The first step of engaging and building partnerships was achieved with the launch meeting. A process leading to the finalization of the governing structure has been initiated and an agreement reached on the initial composition of the Governing Board. Leaders of the Sector Actors Group (SAG) and the Scenarios Focus Group (SFG) were selected. The SAG and the SFG are important organs of the initiative's governing structure. Both groups will support the development and application of the scenarios.

- The meeting culminated with substantial financial commitments and expression of interest from the participating organizations. Discussions were initiated with the World Bank, the Asian Development Bank (ADB), the African Development Bank (AfDB), the Qatar National Food Security Program (QNFSP), and the OPEC Fund for International Development (OFID) to explore potential mechanisms for funding.

BACKGROUND

The Water Futures and Solutions: World Water Scenarios Initiative (referred to herein as the WFaS Initiative) started through a partnership of the International Institute for Applied Systems Analysis (IIASA), the International Water Association (IWA), the Ministry of Land, Transport and Maritime Affairs of the Republic of Korea, the United Nations Educational, Scientific and Cultural Organization (UNESCO), and the World Water Council (WWC), and continues to add new partners. The Initiative's principle goal is to provide a sound scientific basis for responding to future global water challenges by testing possible optional measures proposed as solutions against a range of scenarios for future socio-economic changes and technological innovations in a context of global environmental challenges such as climate change and land use intensification. The WFaS Initiative aims to bring together decision makers from around the world to share experiences, solicit their priorities and discuss a common vision of possible water futures as input for developing a new generation of global, regional and country-based water scenarios and options to address current and future water needs.

The five-year initiative will build on accomplishments by UNESCO through the World Water Assessment Programme and will utilize ongoing scenario work with the Shared Socioeconomic Pathways (SSPs) that are being developed in the context of the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report (AR5). The WFaS Initiative will follow IIASA's Applied Systems Analysis approach, which has enabled groundbreaking assessments such as the recent Global Energy Assessment (www.globalenergyassessment.org). The scenario development will be augmented with existing methodologies, data sets, information exchange networks, and impact calculators that the WFaS Initiative will make available in useful formats to serve as tools that decision-makers can use to set goals, make plans and identify robust options for action. The initiative is a multi-layered cross-sector assessment of the state of water resources and water demand using state-of-the-art socio-economic and hydrological models combined with stakeholder-informed scenarios of key drivers to identify and test a full set of robust strategies, policies, technologies and solutions.

The launch meeting of the WFaS Initiative took place on 4-5 February 2013 at IIASA, Laxenburg, Austria, jointly organized by its lead partners IIASA, UNESCO, The Ministry of Land Transport and Maritime Affairs - Republic of Korea, WWC, and IWA, in coordination with the Austrian Government. The meeting provided a platform to present the objectives and underpinnings of the WFaS Initiative and created an opportunity for prospective partners to discuss current and anticipated challenges in the water sector and to explore opportunities on how to participate in the initiative. Some 80 participants from a broad range of institutions attended the WFaS launch meeting, including senior representatives from government and non-government organizations, the business sector and academia.

This report provides a summary of the rich discussions and key conclusions of the launch meeting. It includes also the expression of interest and financial commitments received from participating organizations and the follow-up activities that will lead to the 2015 7th World Water Forum in Korea where the results of the initiative will be presented. Supplementary information is provided in three annexes: Annex I - Programme of the Launch Meeting; Annex II: List of Participants at the Launch Meeting; and Annex III: Background Document - Water Futures and Solutions: World Water Scenarios Initiative.

EXPRESSION OF INTEREST & (FINANCIAL) COMMITMENTS

The text below provides an overview of expression of interest and (financial) commitments from some of the participating organizations and governments.

- The initiating partners of the WFaS Initiative, namely, the International Institute for Applied Systems Analysis (IIASA), the Ministry of Land, Transport and Maritime Affairs of the Republic of Korea, the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Water Association (IWA) and the World Water Council (WWC) reaffirmed their initial commitment to support the initiative in several ways. This included a reassurance of financial contribution and various forms of in-kind contribution from all initiating partners.
- **IIASA** initiated the project and provided initial funding at the level of € 250,000 in 2012 and € 400,000 in 2013. This contribution of € 400,000 per annum will be sustained during the entire duration of the project.
- **UNESCO** brings to the partnership the background of work done on World Water Scenarios by its World Water Assessment Programme with support from Italy, the World Water Council, the 6th World Water Forum, and Norway. A second tranche of funding provided by Norway to UNESCO via UN-Water will finance part of the work being done in Perugia and meetings of the SFG and SAG.
- The **Government of the Republic of Korea**, represented by the Ministry of Land, Transport and Maritime Affairs and the Korea Water Forum has co-initiated and is providing a substantial organizational and funding support to the entire initiative. This support is centered on project contribution to the 7th World Water Forum.
- **WWC** has been a partner since it supported the World Water Scenarios Project and the presentation of the first reports at the 6th World Water Forum in Marseille. The Board of Governors WWC continues to support the WFaS Initiative and to encourage its presentation at the 7th World Water Forum in Korea (WWF7). Possible financial support will depend on the arrangements for financing of WWF7.
- The **Asian Development Bank** (ADB) was pleased to learn about the WFaS Initiative. As water could become a major limitation for Asian development, the ADB is prioritizing improved water use efficiency and demand management. Currently ADB is conducting country-level water assessments in pursuant of its Asia 2050 development agenda. IIASA and the WFaS Initiative can be a good venue for collaboration with the intended Asia Water Information System and the Asia 2050 water study. ADB is keen to explore co-funding arrangements for the WFaS Initiative through a regional study and expressed its interest in using the results to inform its decision making process.
- The **African Development Bank** (AfDB) has many projects at different levels in Africa. AfDB needs information and data to guide its investment strategy in Africa, e.g. to increase resilience to climate variability in the Horn of Africa, or to better manage the abundance of water in the Congo Basin. Data collection is ongoing and AfDB is ready to share data and information with the WFaS Initiative. At the same time, AfDB is interested in funding sub-regional studies in a number of priority basins in Africa.
- The **Federal Government of Austria** will participate in the WSaF initiative and explore funding of the initiative.
- The **Government of Hungary** has invited the WFaS Initiative at the Budapest World Water Summit (2013, 8-11 October) and will support financially the hosting of the second Governing Board meeting as an adjacent event during the summit.

- The **Academy of Sciences in Malaysia** (ASM) is inviting IIASA to their May, 2013 meeting to brief stakeholders in Malaysia on the WFaS Initiative. ASM has launched its mega-science framework and is expanding research into sensitive areas, e.g. palm oil plantations, related water issues and sustainability of the industry and the potential of palm oil to contribute to the energy sector. ASM expects through this study that water groups within the academy will collaborate with IIASA and its partners in the initiative. ASM is looking forward to the results of the initiative, especially with regard to the nexus issues of water, energy and green industry.
- **AQUAFED**, the International Federation of Private Water Operators, works with governments and with industry and business communities. AQUAFED can bring inputs to the scenario process and provide a reality check of the scenarios based on their practical experiences and understanding of global water challenges.
- The **Bibliotheca Alexandria** (BA), Egypt will lead the Scenarios Focus Group. They will facilitate links with stakeholder groups globally and lead a country specific study in Egypt.
- The **Food and Agriculture Organization** (FAO) of the United Nations will contribute data – AQUASTAT and FAOSTAT – as well as agricultural technical knowledge and its experiences, in particular with increasing water productivity in agriculture. FAO acknowledges the importance of the initiative. The organization has only limited regular funds available and will participate in resource mobilization.
- The **International Water Management Institute** (IWMI) has been undertaking a "Comprehensive Assessment of Water Management in Agriculture" including various scenarios that can be linked with the WFaS Initiative and several work programs dealing with sustainable intensification of agriculture, climate variability management, improved irrigation systems, etc.
- The **Joint Research Centre** (JRC) - the European Commission's in-house science service - needs water scenarios to support decisions about investments and future directions to match water availability and water demand. JRC is engaged in new water activities to build an evidence information base on the water-agriculture-energy nexus in the Danube basin, a Niger sub-basin and the Mediterranean region.
- The **Ministry of Foreign Affairs, Italy** perceives an urgent need for holistic approaches to address the water-food-energy-nature nexus and is looking forward to the results of the WFaS Initiative. They are looking for specific targets and indicators regarding water to assist with guidelines on water resources management, and they expect a tool for managing cross-sector water demands.
- The **OPEC Fund for International Development** (OFID) would like to collaborate on issues relating to water-energy nexus in Africa and Asia. The predictions of scenarios will direct OFID on the right path to follow for their activities in the two regions. OFID will explore funding possibilities to support the WFaS Initiative.
- The **Organization for Economic Cooperation and Development** (OECD) is investigating the intersection of climate, biodiversity and water with economic growth. A new research focus is to look at the implications of resource scarcity and degradation on economic growth. OECD's experience from its Environmental Outlook to 2050 could complement and contribute to the WFaS Initiative. Collaboration to identify synergies and how these factors can be included in the models would be of interest.
- The **Pakistan Academy of Sciences**, a National Member Organization of IIASA, has invited IIASA to present the WFaS Initiative at the First International Conference on Intelligent Water Grids (IWG) where national and international experts will discuss the grand challenges related to the management of water resources in Pakistan. The WFaS Initiative will be useful for the Pakistan water scenarios that will be developed through a new 5-year study. Currently, research in Pakistan focusses on

linkages between sectors and is extremely interested to learn about the tools that will be developed by the WFaS Initiative. In particular, the energy-water-environment nexus provides an ideal opportunity for joint research in Pakistan.

- The **Qatar National Food Security Program** (QNFSP) will support and work with the initiative by contributing data and sharing their knowledge on scenarios development. QNFSP will also explore the possibility of making funding available.
- The **Watercyle Research Institute** (KWR), Netherlands will lead the Sector Actors Group. They will facilitate links with the water utilities network and offer information on benchmark projects and demo-sites they have implemented in the past.
- The **Water Research Commission** (WRC), South Africa can offer itself as a very interesting laboratory for the WFaS Initiative. With research networks across sub-Saharan Africa and river basins that are data-rich and fairly well researched, South Africa is well prepared to serve as a research hub in the region.
- **Suez Environment** is committed to the WFaS Initiative. They will bring to the initiative their experience and knowledge, can help assess the robustness of proposed solutions, and can cooperate in defining realistic transition pathways for water technologies.
- The **World Bank** has good contacts in many countries around the world and can offer collaboration in the areas field of water-for-energy within six geographic areas. World Bank is also willing to make some funds available.
- The **World Wide Fund for Nature** (WWF) like the **International Union for Conservation** of Nature (IUCN) will provide opportunities for testing scenarios and options within their networks.

FOLLOW-UP ACTIVITIES

The following activities are envisaged leading up to the 7th World Water Forum:

1. *Further Expansion and Inclusion*: Efforts to expand the initiative's reach beyond the meeting participants to include additional partners and co-funding institutions has been initiated. Meetings will take place in India, Pakistan, Philippines and the US (2013, February and March).

2. *Meeting of the Initial Project Group:* Invited project parties will meet at IIASA (2013, 6-8 May). The meeting will bring together water scenarios researchers and modeling experts to prepare the work plan and finalize revised stylized scenarios and indicators of critical dimensions for the stakeholder groups meetings.

3. *Negotiations with Funding Parties*: Discussions have been initiated with several funding parties to explore funding mechanisms. These include World Bank, the Asian Development Bank (ADB), the African Development Bank (AfDB), the Qatar National Food Security Program (QNFSP), and the OPEC Fund for International Development (OFID). Similar discussions are ongoing with the Organization of American States (OAS) and the Inter-American Development Bank (IDB), the United States Agency for International Development (US AID), and the United States Army Corps of Engineers - Institute for Water Resources (US ACE-IWR) on funding possibilities linked to specific regions or collaboration on basin-specific projects, as well as support for central activities.

4. *Presentation of the WFaS Initiative:* The WFaS Initiative will be presented to the preparatory meeting of the 2015 7th World Water Forum in Korea (2013, 13-15 May) and the Budapest World Water Summit (2013, 8-11 October).

5. *Meeting of the Project Group:* The whole project group, including regional leads will meet at IIASA (2013, 17-19 June). The meeting will bring together water scenario researchers and experts to strengthen the work plan of the initiative.

6. *Establishment of the Interim Governing Board*: The WFaS Initiative will be steered by a Governing Board. An agreement was reached on the initial composition of the Governing Board, and a process leading to the finalization of the governance structure was initiated. Within two weeks after the launch meeting, additional members among the participants of the launch meeting will be invited to join the Governing Board.

7. *Meetings of the Governing Board*: The first meeting of the Interim Governing Board will take place in Korea beside the preparatory meeting of the 2015 7th World Water Forum in Korea (2013, 13-15 May), the second Governing Board meeting is scheduled to take place at the Budapest World Water Summit (2013, 8-11 October) upon the invitation of the Government of Hungary. The third meeting will take place in November, 2014. Its location has not yet been finalized.

8. *Formation of Stakeholder Groups*: Discussions on the composition of the Sector Actors Group (SAG) and Scenario Focus Group (SFG) was initiated during the launch meeting. Both groups will provide guidance to ensure the global and regional relevance of the scenarios. The SAG will be led by Prof. Dr. Wim van Vierssen, (KWR Watercycle Research Institute, The Netherlands) whereas the SFG will be chaired by Dr. Ismail Serageldin, (Bibliotheca Alexandria, Egypt).

9. *Meetings of the SAG and the SFG*: The first meeting of SFG is scheduled for 17-19 June 2013. Sector representatives participating in the SAG will hold their first meeting on 19-21 June 2013. Both groups are scheduled to meet for the second time on 2-6 December 2013. The third meeting of the SFG and the SAG is tentatively scheduled for November 2014.

10. *Regional Workshops*: The initiating partners are discussing the possibility of holding respective regional workshops around the SAG and SFG group meetings, to foster communication and synergies among the global stakeholder panels and the regional workshops.

11. *Publication of Phase 1 Report*: A report on the first phase of the WFaS project, presenting new global water scenarios and the status of regional and other analyses, will be published at the 7th World Water Forum being organized in Korea (2015 May).

PROCEEDINGS OF THE LAUNCH MEETING

Day 1: Plenary - Opening Remarks:

International Institute for Applied Systems Analysis (IIASA) - Professor Dr. Pavel Kabat:

IIASA Director/CEO, Professor Dr. Pavel Kabat welcomed the participants on behalf of IIASA and partners of the initiative. The initiative brings several innovations to the study of water resources. It is a unique partnership between academia, business, non-governmental organizations, and the UN. Secondly, it will apply a number of different models and methodologies of water –related research at both global and regional scales to provide a set of scientifically strong and robust water scenarios to support decision making under future uncertainties.

Austrian Government - Ambassador Erwin Kubesch, Ministry of Foreign Affairs:

Ambassador Erwin Kubesch from the Austrian Federal Ministry for European and International Affairs emphasized the relevance of the initiative in the face of mounting global water challenges. The increasing intensity and frequency of floods and droughts, as well as the overall high levels of water demand of a growing and wealthier global population are likely to further increase the pressure on water resources and aquatic ecosystems. Improved data and comprehensive knowledge of water resources and water demand are needed to respond to the challenges that global, regional and local water systems will face in the future. The water scenarios to be developed by the WFaS Initiative should be consistent with other global scenarios, e.g. such as those being developed for IPCC AR5 or in international energy assessments and they should bring together inputs from a full range of stakeholders including decision makers, scientists, experts from government, private sector and other stakeholders.

United Nations Educational, Scientific and Cultural Organization - Mr. Hans D'Orville:

Mr. Hans D'Orville, Assistant Director General for the Bureau of Strategic Planning at UNESCO, highlighted the importance of improved management and planning of freshwater water resources for building a sustainable society. Water is seen as the epicenter for peace and health and it is a key component of sustainable development. Information of future water resources and demands and the development of robust solutions are important to reduce the risks of potential water conflicts in the future.

Ministry of Land, Transport and Maritime Affairs of Korea - Mr. Yang-Jin Oh:

Mr. Yang-Jin Oh, Director, Ministry of Land, Transport and Maritime Affairs of Korea, revealed some of the steps taken by the Korean Government to respond to climate change and improve water resources management in the country. The Korean Government is aware of water related global problems; heavy rainstorms have almost doubled in the last few years and at the same time droughts are predicted to intensify in the future. These global issues need to be addressed for a better future by sharing knowledge and experience, hence the importance of participating in the WFaS Initiative. Korea will host the 7th World Water Forum in 2015. Among other things, the forum will provide a global platform to discuss water related challenges and solutions. Korea is looking forward to a successful project from the WFaS Initiative, and eventually the presentation of the findings at the Forum in 2015.

World Water Council (WWC) - Professor Dr. Ben Braga:

According to Dr. Ben Braga, President of WWC, the best way to predict the future is to invent it. The WFaS Initiative is a stepwise process to both predict and invent the future with respect to water. He referred to the ongoing efforts to formulate post-2015 sustainable development goals, as well as subsequent scenarios of the World Water Assessment Programme. There are enormous challenges ahead of us and the WFaS Initiative will be a joint vehicle for inventing the future. Water should be used to catalyze change, which requires above all maintaining healthy ecosystems, to overcome the challenges ahead. Any proposal for creating a pact for water security, guaranteeing economic and social security, requires the consideration of more efficient water systems. The WWC provides a unique platform for developing solutions and recommendations to trigger the changes that are necessary. The WWC will support the initiative and will approach policy makers and decision makers, with a focus on providing options for high-level decision making.

International Water Association (IWA) - Dr. Glen Daigger:

IWA President, Dr. Glen Daigger was impressed with the diversity of participants present. The launch meeting brought together water professionals from governments, water utilities, the private sector, several UN agencies, renowned research organizations and several international financing institutions, including the World Bank, the Asian Development Bank (ADB) and the African Development Bank (AfDB). The decisions being made today are creating the future. Continuing to do business-as-usual is not acceptable because implementing merely a few small changes will not fix the challenges of the future water system. With the international and intellectual resources of the WFaS Initiative, it is advisable to move on to a common vision and possible trajectories that the world can rely on. Most importantly, we should consider how we can achieve the behavior changes that are needed in many sectors to avoid continuation of the business-as- usual approach.

Day 1: Plenary - Key Speeches:

Water Challenges, Transitions and Innovations - Professor Dr. Pavel Kabat:

IIASA Director/CEO, Professor Dr. Pavel Kabat presented the rationale for the initiative, with emphasis on transitions and innovations to reach water security by 2050. Previous initiatives to tackle global water challenges have yielded only marginal outcomes. So what is new this time? Key for the current initiative is the multi-model, multi-purpose and multi-scale approach, with a focus on regional scale and cross-boundary issues. This has not been done before. “Previously we published successfully and we commonly did that with one single tool, but other colleagues have other models and good ones too”. For finding robust solutions, the science community should try to combine all useful and available global models. The tools and data will for the first time be completely coherent and consistent with other on-going work and databases. Currently, IIASA is hosting major global databases of GDP, population and land use, for example. In addition, partnership in knowledge is needed. For this reason, the WFaS Initiative is partnering with governments, the private sector, NGOs and several UN agencies, renowned research institutions and international organizations. The WFaS Initiative will view water futures as an opportunity. Future water is also about doing business. The focus is not only on how many hotspots of water crisis exist, but foremost about transitions that can provide solutions. One of the possible solutions

is progress in technology. For example, desalination techniques can produce freshwater from saline water but this is currently too expensive to apply for countries like India and Bangladesh. Yet, innovations in technology can bring costs down and can make desalination less expensive and economically viable. Our partners in the private sector can suggest to us what is feasible and plausible.

Strategic Foresight and Insight based on Scenarios and Modeling - Dr. Olcay Unver:

The Coordinator of UNESCO's World Water Assessment Programme, Dr. Olcay Unver gave a synthesis of recent scenarios and modeling studies in a number of sectors that have influence on high level policy and decision making for strategic water issues. The Millennium Ecosystem Assessment (MEA) looked at differentials – reactive ecosystem management versus proactive management; UNEP's Global Environmental Outlook (GEO) considered a conventional versus a sustainable world. The IPCC 5th Assessment Report, expected to become available next year, is based on a new set of global scenario storylines, the Shared Socio-economic Pathways (SSPs). There are several energy scenarios with various shapes and formats. The Global Energy Assessment (GEA) defines a new global energy policy agenda and is transforming the way society thinks about energy. The World Energy Outlook scenarios of the International Energy Agency discuss trends in the energy market, as well as insights into energy use. The UN Food and Agriculture Organization (FAO) has taken the lead in the development of agricultural scenarios. For example, Agriculture at a Crossroad provides perspectives on food and agriculture up to 2050, with knowledge, science and technology for improvements in livelihoods. The OECD/FAO Agricultural Outlook scenarios provide market projections into the next decade and discuss emerging issues such as food prices and non-food biomass use. The last global water scenarios were published over ten years ago by the World Water Council with a set of drivers as externalities causing the changes in the water domain. UNESCO's partnership with IIASA led to this new WFaS Initiative, to develop a new set of water scenarios and solution options with the understanding that technologies, socio-economic conditions and the political scene in the world have dramatically changed during the last decade.

Water Industry: Needs and its Role in Water Transitions- Dr. Glen Daigger:

IWA President, Dr. Glen Daigger outlined the concerns of the business community for future water development. He provided some insights on how the WFaS Initiative may collaborate with governments, NGO's and the business sector to identify sustainable solutions. His talk focused on the water industry, innovation and the role the industry can play. "We need to understand how technologies will develop and need to look at the full range of issues including information technology and biotechnology". Despite fast developments in technology (e.g. ICT), in orders of magnitude that were hardly imaginable years ago, seemingly great solutions don't get applied. These technologies can really help water sector practitioners to advance what they are currently doing to address the challenges in the water sector. Patterns of water use differ with regions and between developed and developing countries. The water sector is important but other sectors are essential as well, given that decisions in the water sector affect other sectors and vice versa. Such cross-sectoral perspective "is what excites me and gives me food for thought as we look for ways to go forward".

Water Futures and Solutions Initiative - Dr. William Cosgrove:

Project Director Dr. William Cosgrove of IIASA's "Water Futures and Solutions: World Water Scenarios", gave an overview of the WFaS Initiative with emphasis on the approach, the expected outputs and benefits for different stakeholders. On the approach, he reiterated that a lot has been learnt from past mistakes. Important social science dimensions were lacking in previous water scenarios - this time, people's behavior needs to be taken into account, with a focus on specific questions and relevant scales. Sub-global studies at the river basin scale with consideration of the interactions between different actors are particularly important. The WFaS Initiative will work with other ongoing and planned initiatives on regional water scenarios, for example, the initiatives of the Asian Development Bank (ADB) in the Asia-Pacific region, the US Army Corps of Engineers (USACE) on the Columbia River Basin concerning transboundary issues and negotiations with Canada, and the Guarani Aquifer in South America on groundwater issues. The WFaS Initiative will also account for the need to share water with ecosystems in a sustainable way, which is a shift away from the previous mundane focus on human needs only. Another confounding factor is climate change, which directly impacts on regional water resources. "We don't want decision makers to be confused; so the initiative will use the most recent approach of the IPCC with the Shared Socio-economic Pathways to achieve globally consistent water scenarios". There are ongoing discussions on how best to include politics and governance mechanisms in the scenarios. Application of an advanced system analysis approach to address water futures is important, because of their complexity and the necessity to include different kinds of knowledge and disciplines. From the very beginning of the WFaS Initiative, stakeholders will be involved in the entire process through the Sector Actors Group (SAG) and the Scenarios Focus Group (SFG), which are two vital organs the initiative will rely on for developing the scenarios. Both the SAG and the SFG are key constituents of the Initiative's scenario building exercise (Annex III: Background Document - Water Futures and Solutions: World Water Scenarios Initiative).

Day 1: Breakout Sessions

Breakout sessions provided an interactive workshop setting for participants to discuss several priority issues: i) key actions needed to meet increasing water demand; ii) knowledge and information requirements, as well as transitions (technology, policy, institutions, etc.) needed to address current and future water challenges; and iii) value-added and key contributions expected from the WFaS Initiative. The discussions provided insights from a large number of participants that will define the tasks of the Sector Actors Group (SAG) and the Scenarios Focus Group (SFG) over the next 24 months.

Actions for Addressing Increasing Water Demand:

The participants in the breakout sessions emphasized the need for an integrated assessment of water futures, including water resources, water governance and the global drivers of water demand. Many contributions were focussed on irrigation and on agricultural water use, because the sector is globally by far the largest water user and can therefore play a key role in finding solutions to reduce overall future water withdrawals. Participants discussed the efficiency of water use in agriculture, how to optimize agricultural production without necessarily increasing the water demand. Notably, in some regions up to 50% reduction in water use could be achieved through better practices in agriculture. Various suggestions

were also made to reduce food wastage. Estimates suggest that roughly 30 to 50% of food is being wasted and agricultural water use could simply be reduced by diminishing current food wastage.

Other participants spoke of the need to reduce water withdrawals in other sectors like energy, industry and urban domestic water use. Improved water demand management is crucial to reducing leakage and wastage of water. Development of water infrastructure and water supply must go hand in hand with demand management. For the urban water sector, there is a need to provide and collect information through, for example, smart metering in order to raise awareness among water users. This should be transparent and the information must be made available in real-time on a daily basis. The question, however, is how to best create awareness among the largest users, the agricultural, energy and industry sectors. Also, additional research and sharing of experiences is needed regarding the type of measures that work and those that do not support effective implementation of more advanced management systems.

There were also discussions on groundwater resources – their potential to cope with projected increases in water demand. Severe limitations were noted in the knowledge of groundwater availability in many regions of the world. New prospective technologies to detect and measure groundwater resources are being developed, for example interpretation of satellite imagery to estimate groundwater availability.

Finally, participants emphasized the importance of institutional issues, management systems and governance mechanisms, the role of a bottom-up water management approach (vs. top-down planning), and the need to listen to water users because of the important information they have to contribute to demand management.

Transitions Required to Address Water Challenges:

Timely access to basic information and integrated planning tools are required to address future water challenges and to enhance water management. In addition, a better understanding of policies and institutions and their effectiveness is needed including the role of communication and information sharing. In order to accelerate transitions into the future, additional information and decision support tools have to be available for the choices that have to be made under different development pathways. However, the required transitions demand more than improvements in information and the availability of decision support tools. For instance, effective communication and information sharing is essential to facilitate the transformations that are required. Moreover, the genuine organization of policy, institutions, education, technology, and investments opportunities is needed to make transitions happen. Major transitions could come from pressure on policy makers by the public, and the media can be helpful in that regard.

Participants' Expectations of the Water Futures and Solutions Initiative:

Participants widely expressed the expectation that the water scenarios will be developed in a way that the process and results are owned by all stakeholders. Partnerships should be established for collective ownership across public and private sectors. The WFaS Initiative should aim to reach out to those actually making the decisions on water management. While being responsive to water sector concerns, the scenario development is clearly not only a water sector driven exercise. Consensus building across sectors

must be a goal throughout the process and the results should be used to support and coordinate planning across all sectors that depend heavily on water. Hence, scenario development must involve the energy and agricultural community and the results and solution options must be communicated and shared with these stakeholders. Water is an integrative and cross-cutting resource. Scenarios must be interdisciplinary and elaborate the nexus between water, poverty, food, energy and security. The scenarios should explore the impacts of different choices in the water sector and should offer practical guidance for the policy debate, providing tangible options and solutions. Multi-models assessments are useful to account for uncertainties and increase the robustness of policy responses and the effectiveness of solution options. Finally, the WFaS Initiative should provide widely accessible data sets that are consolidated, integrated and applicable across different scales. In particular, the initiative should aim to provide datasets and scenario information at the country-level, which was regarded as the most appropriate level for policy making. The initiative needs to mobilize individual countries or regions with shared needs and priorities to address them jointly. The initiative can be helpful to better assess ecosystem services to frame the discussion of water sector trade-offs and identification of win-win outcomes. Therefore, sustainable water sharing with nature must be an integral part of the scenarios building process. Lessons should be learnt from the climate debate by avoiding the alarmist way of presenting the issues and instead provide acceptable science-based solutions and new opportunities.

Day 2: Panel Discussions

During the five panel discussions, each with five to six participants from participating organizations, the panelists introduced their organization and stated the current priorities and challenges they are facing in the water sector. Panelists spoke of measures they are currently taking to address water challenges and they commented on how they expect to benefit from the WFaS Initiative and how they could support the initiative through joint pursuit of research opportunities, sharing of data/knowledge and/or through financial contributions.

Challenges, Needs and Priorities:

There was agreement that in addition to biophysical limitations a major challenge for the water sector is about the “software” component, in particular political support, regulations and financial commitment. Also, for most countries, long-term reliable hydrological data, which is needed for water management, is lacking at the local scale. Missing as well is the understanding of the interconnectedness among various sectors and the links between climate variability and the rise in natural disasters such as floods and droughts. In countries like Croatia, there are no acute problems with water scarcity but due to seasonality and climate variability there are technical problems with water supply. Water withdrawals in Croatia are expected to increase with increasing demands for irrigation, electricity generation, tourism and fish farming. Securing water systems and protecting aquatic ecosystem while addressing droughts and floods is a main challenge in Korea. In Indonesia, a number of surface water bodies are suffering from pollution, with potential problems of water shortage expected. The continued degradation of natural capital has an impact on economic growth. According to the Asian Development Bank (ADB), water availability may become a major constraint for Asia’s economic development and water use efficiency is pursued in ADB’s development programs.

Competing water demands call for innovations and transitions in the way things are currently being done, but different regions have different priorities and needs. In Uganda for example, the priority is residential water supply and distribution, but also water for irrigation and hydropower generation. There are poor water management practices in use, which must be addressed but the lack of reliable data and limited financial resources are making management and regulation difficult to undertake. In Egypt and Bangladesh, sea level rise is important and its impacts on agriculture are large due to salt water intrusion. Overall, the population densities are high in the delta regions at risk of salt water intrusion. The likely impacts of salt water intrusion should be reflected in water scenarios to understand the consequences for water availability in the future. Transboundary water management is crucial for the International Union for the Conservation of Nature (IUCN), especially for addressing conflicting national and sectorial interests and for implementing climate change adaptation and mitigation measures. The OPEC Fund for International Development (OFID) is keen to unveil the water-food-energy nexus, especially with regard to water for irrigation and electricity generation. Africa and Asia will be the main focus of OFID's activities in the coming years, and the modeling of future scenarios can direct OFID toward making the right decisions in supporting development. Croatia has established a country water resources assessment program in view of the EU requirement for harmonization of the environmental status of its waters. Results are showing that scenarios can assist in achieving better national management of water resources that is consistent with international development objectives. For Italy, the transfer of knowledge in water management is a priority to support planning and adoption of special guidelines for water resources management. Many organizations are looking for data and information, for integrated planning tools and a better understanding of policies and institutions and their effectiveness. It is important to develop tools and communication mechanisms for those who are actually making decisions. For example, the African Development Bank (AfDB) is seeking information and decision making tools that will help them to make effective and robust investment decisions. Several organizations indicated that the initiative should have a close link with the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs) process in order not to forget the bottom billion people who currently lack adequate water supply and improved sanitation. Water futures will be different if the world can agree on common sustainable water sector goals and the WFaS Initiative could contribute to the process of setting post-MDG water targets, a process which is already underway.

CONCLUSION

The first step of engaging and building partnerships for the "Water Futures and Solutions - World Water Scenario Initiative" was achieved with this launch meeting. The active engagement of participants resulted in vibrant discussions and informative exchange with a clear direction and approach for the WFaS Initiative. The launch meeting outcomes will be used to guide further development and implementation of the initiative. The encouraging enthusiasm among the participants strongly affirmed that the initiative can be a mechanism of change to stimulate thinking and action on water management globally. There is a shared vision to develop a stakeholder-driven set of global water scenarios that are consistent with recent global energy and climate change scenario efforts to explore water futures towards robust solutions under different future development pathways.

ANNEXES

Annex I: *Programme of the Launch Meeting*

Annex II: *List of Participants at the Launch Meeting*

Annex III: *Background Document – Water Futures and Solutions: World Water Scenarios Initiative*

Water Futures and Solutions: World Water Scenarios Initiative Launch Meeting

4–5 February 2013

IIASA, Laxenburg, Austria

AGENDA

Day 1: Monday, 4 February 2013

11:00 **Coach Departure from Hotel Hilton Vienna (Stadtpark) to IIASA**

11:30 ***Sandwich Lunch (Conference Foyer)***

12:30 **PLENARY: SETTING THE STAGE (Wodak Room)**

Welcome Addresses (40 min.)

International Institute for Applied Systems Analysis (IIASA)
Professor Dr. Pavel Kabat, Director/CEO
Federal Ministry of Foreign Affairs of Austria
Ambassador Erwin Kubesch
United Nations Educational, Scientific and Cultural Organization (UNESCO)
Mr. Hans D'Orville, Assistant Director-General for Strategic Planning
Ministry of Land, Transport and Maritime Affairs (MLTM) of Korea
Mr. Yang-Jin Oh, Director
World Water Council (WWC)
Professor Dr. Ben Braga, President
International Water Association (IWA)
Dr. Glen Daigger, President

Water Challenges, Transitions and Innovations 2050 (15 min. + 5 min. Q&A)
Professor Dr. Pavel Kabat, Director/CEO, IIASA
Introduction of the rationale underlying the Water Futures and Solutions: World Water Scenarios Initiative with a focus on transitions and innovations to reach water security by 2050.

Strategic Foresight and Insight based on Scenarios and Modeling (15 min. + 5 min. Q&A)
Dr. Olcay Ünver, Coordinator, WWAP, UNESCO
A synthesis of recent scenarios and modeling studies in sectors that influence high level policy and decision making on strategic issues.

Water Industry: Needs and its Role in Water Transition (15 min. + 5 min. Q&A)
Dr. Glen Daigger, President, IWA and *Dr. Ger Bergkamp, Interim Executive Director,* IWA
Outlining the concerns for the business community for their future development; how they may collaborate across economic sectors and with governments and NGO's to identify sustainable solutions.

Water Futures and Solutions Initiative (15 min. + 5 min. Q&A)
Dr. William Cosgrove, Project Director, Water Futures and Solutions: World Water Scenarios, IIASA
Overview of the Water Future Initiative with an emphasis on the approach, the results, the outputs and the value of these for different stakeholders.

Discussion (20 min.) — Reactions from the Project Initiating Group and Participants

14:50 Coffee Break

15:15 BREAKOUT DISCUSSION SESSIONS (See Annex 1)

Current and Future Water Use: Innovations and Required Transitions (Wodak Room)
No future water security can be achieved without major transitions and innovations in concepts and technologies, behavior and management. To accelerate these transitions and innovations the policies, institutions, regulations and incentives regarding water, energy, industry, urban planning, agriculture, environment and rural livelihoods need to change.
Participants will provide input on what they consider the most important challenges to meeting water demands and the changes (transitions) required. They will also contribute ideas for innovative approaches and technological innovations to address the issues identified during the discussion.
This discussion will provide key input to defining the content of the Sector Actors Group work programme over the coming 24 months.

Scenarios and Modeling for Strategic Insight and Foresight: Demands, Opportunities and Constraints (Gvishiani Room)
Assuring sustainability and security of water resources requires strategic insight and foresight which are enhanced through scenarios and modeling.
Participants will provide input on the demand for strategic insight and foresight, the information and tools that are currently employed to provide it. The usefulness of the available tools and information for decision making, gaps between requirements and availability, and integration across sectors will be discussed.
This discussion will support defining the content of the Scenarios Focus Group.

17:00 Coffee Break

17:30 PLENARY: FINE-TUNING THE WORLD WATER FUTURES INITIATIVE APPROACH (Wodak Room)
Chair: *Professor Dr. Pavel Kabat,* Director/CEO, IIASA

Recap of Breakout Sessions (20 min. panel discussion with rapporteurs)

Discussion (35 min. discussion)

- Expected results and outputs from Water Futures Initiative
- Strategic insight: supporting water decisions across sectors
- Strategic foresight: applying scenarios and modeling
- Priorities and knowledge gaps

Concluding Remarks (5 min.)
Professor Dr. Pavel Kabat, Director/CEO, IIASA

18:30 Adjourn

18:45 Dinner at IIASA's Schloss Restaurant

21:30 Coach Departure to Hotel Hilton Vienna (Stadtpark)

United Nations Educational, Scientific and Cultural Organization | IIASA | Ministry of Land, Transport and Maritime Affairs | World Water Council | IWA International Water Association

Day 2: Tuesday, 5 February 2013

09:30 **Coach Departure from Hotel Hilton Vienna (Stadtpark) to IIASA**

10:30 **WELCOME AND INTRODUCTION ON DAY 2 (Wodak Room)**
Professor Dr. Pavel Kabat, Director/CEO, IIASA

10:35 **PANEL DISCUSSIONS: CHALLENGES, PRIORITIES, NEEDS AND COMMITMENTS (See Annex 2)**
In panel discussions, a representative from each attending organization and ministry will have approximately 5 minutes to introduce and describe the organization and its current priority challenge. Representatives are invited to state how they are currently planning to address this challenge, how the World Water Futures initiative might help, and what opportunities there are to provide information, participate in research, and support the initiative financially.

12:30 ***Lunch (Conference Foyer and Gvishiani Room)***

13:30 **PANEL DISCUSSIONS** (continued) **(Wodak Room)**

16:00 ***Coffee Break***

16:30 **CONCLUDING REMARKS AND WAY FORWARD (Wodak Room)**
Chair: *Professor Dr. Pavel Kabat*, Director/CEO, IIASA

United Nations Educational, Scientific and Cultural Organization (UNESCO)
Mr. Hans D'Orville, Assistant Director-General for Strategic Planning
Ministry of Foreign Affairs and Trade of Korea
Ambassador Eun-Kyung Park, Ambassador of Water Resources
World Water Council (WWC)
Professor Dr. Ben Braga, President
International Water Association (IWA)
Dr. Glen Daigger, President

Summary
Professor Dr. Pavel Kabat, Director/CEO, IIASA
Agreement on the initial members of the Water Futures Governing Board, and process for the finalization of governance structure.
Planning for the Water Futures and Solutions: World Water Scenarios consultation meetings.

17:30 **Adjourn**

17:45 **Coach Departures to Airport and Hotel Hilton Vienna (Stadtpark)**

ANNEX 1

15:15 BREAKOUT SESSION: Current and Future Water Use: Innovations and Required Transitions
Room: Wodak Room

Chair: Wim van Vierssen, KWR Watercycle Research Institute
Co-Chair: Ben Braga, World Water Council

Facilitators: Ger Bergkamp, International Water Association
Paul Yillia, IIASA

Morsy	Abu-Youssef	**Egyptian Cultural Counsellor, Vienna**	AUSTRIA
Pradeep	Aggarwal	**International Atomic Energy Agency (IAEA)**	AUSTRIA
Peter	Akari	**African Development Bank Group (AfDB)**	TUNISIA
Giovanni	Bidoglio	**Joint Research Centre**	ITALY
Julia	Bucknall	**The World Bank**	USA
Rick	Connor	**UNESCO-WWAP**	ITALY
Luis	Fiallos	**Ministerio del Ambiente y Recursos Naturales (MARENA)**	NICARAGUA
Dani	Gaillard-Picher	**World Water Council**	UNITED KINGDOM
Dominique	Gatel	**Veolia Water**	FRANCE
Gerhard	Glatzel	**Austrian Academy of Science**	AUSTRIA
Danko	Holjević	**Croatian Waters**	CROATIA
Blanca	Jiménez-Cisneros	**UNESCO**	FRANCE
Seung-Kyum	Kim	**Ministry of Land, Transport and Maritime Affairs (MLTM)**	KOREA
Dražen	Kurečič	**Ministry of Agriculture**	CROATIA
Patrick	Linke	**Qatar National Food Security Program**	QATAR
Irene	Lucius	**WWF International**	AUSTRIA
Jack	Moss	**AquaFed**	FRANCE
Dhesigen	Naidoo	**Water Research Commission**	SOUTH AFRICA
Gèrard	Payen	**AquaFed**	FRANCE
Pavel	Punčochář	**Ministry of Agriculture**	CZECH REPUBLIC
Barbara	Putzi-Schmid	**Ministry of Economy, Family, and Youth**	AUSTRIA
Fuad	Siala	**OPEC Fund for International Development (OFID)**	AUSTRIA
Pasquale	Steduto	**Food and Agriculture Organization of the UN (FAO)**	ITALY
András	Szöllösi-Nagy	**UNESCO-IHE Institute for Water Education (UNESCO-IHE)**	THE NETHERLANDS
Kyung Taek	Yum	**Korea Water Forum**	KOREA

15:15 **BREAKOUT SESSION: Scenarios and Modeling for Strategic Insight and Foresight: Demands, Opportunities and Constraints**

Room: **Gvishiani Room**

Chair: **Pavel Kabat, IIASA**

Co-Chair: **Hee Kyung Park, Korea Water Forum**

Facilitators: **William Cosgrove, IIASA**
Piotr Magnuszewski, IIASA

Muhammad	Abubakr	**Lahore University of Management Sciences**	PAKISTAN
Gábor	Baranyai	**Ministry of Foreign Affairs**	HUNGARY
Anthony	Cox	**OECD**	FRANCE
Glen	Daigger	**International Water Association (IWA)**	UNITED KINGDOM
Hans	D'Orville	**UNESCO**	FRANCE
Irene	Gabriel	**Ministry of Science and Research**	AUSTRIA
Faris	Hasan	**OPEC Fund for International Development (OFID)**	AUSTRIA
Fritz	Holzwarth	**Federal Ministry for the Environment, Nature Conversation and Nuclear Safety**	GERMANY
Qing-he	Huang	**CWRR-CAS**	CHINA
Ahmad	Ibrahim	**Academy of Sciences Malaysia**	MALAYSIA
Gil-Hong	Kim	**Asian Development Bank (ADB)**	PHILIPPINES
Peter	Kovacs	**Ministry of Rural Development**	HUNGARY
Elisabeth	Krueger	**Helmholtz Centre for Environmental Research (UFZ)**	GERMANY
Anna Rita	Laurenzi	**Ministry of Foreign Affairs**	ITALY
Fulco	Ludwig	**Wageningen University**	THE NETHERLANDS
Patrick	MacQuarrie	**International Union for Conservation of Nature (IUCN)**	SWITZERLAND
Munaaba Flavia	Nabugere	**Ministry of Water and Environment**	UGANDA
Yang-Jin	Oh	**Ministry of Land, Transport and Maritime Affairs (MLTM)**	KOREA
Claudia	Pahl-Wöstl	**Universität Osnabrück**	AUSTRIA
Eun-Kyung	Park	**Ministry of Foreign Affairs and Trade**	KOREA
Waltraud	Rabitsch	**Austrian Development Agency**	AUSTRIA
Diego	Rodriguez	**The World Bank**	USA
Karl	Schwaiger	**Federal Ministry for Agriculture, Forestry, Environment and Water Management**	AUSTRIA
Andrew	Segrave	**KWR Watercycle Research Institute**	THE NETHERLANDS
Ismail	Serageldin	**Bibliotheca Alexandria (BA)**	EGYPT
Bo-Mee	Shin	**Ministry of Land, Transport and Maritime Affairs (MLTM)**	KOREA
Vladimir	Smakhtin	**International Water Management Institute (IWMI)**	SRI LANKA
Olcay	Ünver	**UNESCO**	FRANCE

Day 2: Tuesday, 5 February 2013

ANNEX 2

10:35 PANEL DISCUSSION 1: CHALLENGES, PRIORITIES, NEEDS AND COMMITMENTS

Room: Wodak Room

Chair: Hee Kyung Park, Korea Water Forum

Pradeep	Aggarwal	**International Atomic Energy Agency (IAEA)**	AUSTRIA
Gerhard	Glatzel	**Austrian Academy of Science**	AUSTRIA
Faris	Hasan	**OPEC Fund for International Development (OFID)**	AUSTRIA
Danko	Holjević	**Croatian Waters**	CROATIA
Ahmad	Ibrahim	**Academy of Sciences Malaysia**	MALAYSIA
Seung-Kyum	Kim	**Ministry of Land, Transport and Maritime Affairs (MLTM)**	KOREA
Anna Rita	Laurenzi	**Ministry of Foreign Affairs**	ITALY
Gèrard	Payen	**AquaFed**	FRANCE

11:35 PANEL DISCUSSION 2: CHALLENGES, PRIORITIES, NEEDS AND COMMITMENTS (Wodak Room)

Room: Wodak Room

Chair: Hans D'Orville, UNESCO

Muhammad	Abubakr	**Lahore University of Management Sciences**	PAKISTAN
Anthony	Cox	**OECD**	FRANCE
Gil-Hong	Kim	**Asian Development Bank (ADB)**	PHILIPPINES
Dražen	Kurečič	**Ministry of Agriculture**	CROATIA
Munaaba Flavia	Nabugere	**Ministry of Water and Environment**	UGANDA
Yang-Jin	Oh	**Ministry of Land, Transport and Maritime Affairs (MLTM)**	KOREA
Ismail	Serageldin	**Bibliotheca Alexandria (BA)**	EGYPT

13:30 PANEL DISCUSSION 3: CHALLENGES, PRIORITIES, NEEDS AND COMMITMENTS (Wodak Room)

Room: Wodak Room

Chair: Pavel Kabat, IIASA

Brice	Cabibel	**Suez Environment**	FRANCE
Dominique	Gatel	**Veolia Water**	FRANCE
Fritz	Holzwarth	**Federal Ministry for the Environment, Nature Conversation and Nuclear Safety**	GERMANY
Patrick	MacQuarrie	**International Union for Conservation of Nature (IUCN)**	SWITZERLAND
Eun-Kyung	Park	**Ministry of Foreign Affairs and Trade**	KOREA
Vladimir	Smakhtin	**International Water Management Institute (IWMI)**	SRI LANKA
Pasquale	Steduto	**Food and Agriculture Organization of the UN (FAO)**	ITALY

14:30 PANEL DISCUSSION 4: CHALLENGES, PRIORITIES, NEEDS AND COMMITMENTS (Wodak Room)

Room: Wodak Room

Chair: Ben Braga, World Water Council

Peter	Akari	**African Development Bank Group (AfDB)**	TUNISIA
Gábor	Baranyai	**Ministry of Foreign Affairs**	HUNGARY
Qing-he	Huang	**CWRR-CAS**	CHINA
Elisabeth	Krueger	**Helmholtz Centre for Environmental Research (UFZ)**	GERMANY
Irene	Lucius	**WWF International**	AUSTRIA
Dhesigen	Naidoo	**Water Research Commission**	SOUTH AFRICA
Pavel	Punčochář	**Ministry of Agriculture**	CZECH REPUBLIC
Kyung Taek	Yum	**Korea Water Forum**	KOREA

15:15 PANEL DISCUSSION 5: CHALLENGES, PRIORITIES, NEEDS AND COMMITMENTS (Wodak Room)

Room: Wodak Room

Chair: Glen Daigger, International Water Association

Giovanni	Bidoglio	**Joint Research Centre**	ITALY
Julia	Bucknall	**The World Bank**	USA
Luis	Fiallos	**Ministerio del Ambiente y Recursos Naturales (MARENA)**	NICARAGUA
Patrick	Linke	**Qatar National Food Security Program**	QATAR
Karl	Schwaiger	**Ministry for Agriculture, Forestry, Environment and Water Management**	AUSTRIA
Bo-Mee	Shin	**Ministry of Land, Transport and Maritime Affairs (MLTM)**	KOREA
Wim	van Vierssen	**KWR Watercycle Research Institute**	THE NETHERLANDS

Water Futures and Solutions: World Water Scenarios Initiative Launch Meeting

4–5 February 2013

IIASA, Laxenburg, Austria

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Water Futures and Solutions: World Water Scenarios Initiative

Summary

BACKGROUND

In 2000, the World Water Vision[i] prepared under the aegis of the World Water Council was presented at the 2nd World Water Forum in The Hague. It was the product of a ground breaking, stakeholder-informed scenario development process that brought together leading global authorities both within and external to the water domain to think about possible world water futures and develop a joint vision for the future. Scenario development and analysis employed in the Vision exercise allowed decision makers to better understand the consequences of different decision paths on water sustainability and human development. These scenarios were widely used and applied in developing regional water visions, e.g. the African Water Vision, still being used as a guide by the African Council of Water Ministers.

More than a decade later, with pressure on the Earth's freshwater resources and ecosystems continuing to rapidly increase and over-abstraction apparent in many regions of the world, global leaders at Rio+20 acknowledged the core role of water to achieving sustainable development, stressing the critical need to take decisive action today in order to sustainably meet global development objectives. Additional calls for action, for integrated knowledge, policies and management across sectors and disciplines, and for improved assessment of impacts and options using multiple methodologies have been recently made by leading academic journals such as Nature[ii], and by the European Union in its Blueprint to Safeguard Europe's Water[iii].

The ramifications of the types of actions and decisions taken by water managers and other decision makers will impact sustainable development, given the inter linkages of water with poverty and hunger eradication, public health, food and energy security, ecosystem health, agriculture and rural development. In the meantime, events over the past decade have changed the situation in which the earlier scenarios were developed. Indeed, in a world of new technologies, globalisation, competing water demands and accelerating change and increasing complexity in all sectors, decision makers face increasing challenges in ensuring robust approaches to sustainable development.

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[i] Available at: http://www.worldwatercouncil.org/index.php?id=946&L=0target%3D_bla

[ii] Nature Climate Change (2012) "Water at a crossroads." Nature Clim. Change 2:12, doi:10.1038/nclimate1780

[iii] Available at: http://ec.europa.eu/environment/water/blueprint/

To address these challenges, the International Institute for Applied Systems Analysis (IIASA) and the United Nations Educational, Scientific and Cultural Organization (UNESCO), in partnership with the Ministry of Land, Transport and Maritime Affairs of the Republic of Korea, the International Water Association, and the World Water Council, and with initial support from the government of Norway, have joined forces to launch an initiative entitled *Global Water Futures and Solutions: World Water Scenarios*. Through the use of stakeholder-informed scenario development, the initiative will develop and assess a catalog of options for sustainable water resource development and provide a methodology to navigate through the options to find combinations of options that are effective, flexible and robust in different bio-physical and socio-economic settings. The initiative will build on the work accomplished in several international research and scenario assessment projects over the past decade, including IIASA's Global Energy Assessment, and on the initial phase of UNESCO's World Water Scenarios project, to become a key contribution to the global discussion in the related, key forums. The new generation of global and regional scenarios produced will provide a better understanding of the impact of different water-related decisions and choices on sustainable development and human well-being. The first phase of the initiative will culminate with the presentation of a first generation of global, regional, and selected national water scenarios and solution options at the 7th World Water Forum in March or April 2015 in Daegu and Gyeongbuk, Korea. Ultimately, the five-year initiative will provide a set of robust strategies, policies, technologies and solutions to better inform water-sector related decision making - both in public and public/private domains.

Initial work on a World Water Scenarios project began in 2009 under UNESCO-WWAP, with support from Italy, the World Water Council, the International Forum Committee, and Norway, and resulted in two initial reports[iv] released at the World Water Forum in Marseille in March 2012. The fourth edition of the World Water Development Report included a section on the analysis of the drivers, and a literature survey summary of existing qualitative and quantitative global and regional water-related scenarios was produced that served as background information for UN-DESA at Rio+20.

Water Futures and Solutions: World Water Scenarios is a new initiative which fully builds on previous activities and results, but has a significantly enhanced concept as well as scope. The initiative will harness IIASA's unique systems analysis capability in both data management and modeling, and be linked to the IPCC 5th Assessment scenarios work carried out at IIASA. Its global water assessment will utilize IIASA's experience from developing the Global Energy Assessment (http://www.iiasa.ac.at/web/home/research/researchPrograms/Energy/Home-GEA.en.html) that IIASA launched in Rio in June 2012, and the initiative will benefit from the monitoring and assessment capabilities and the reporting functions of the World Water Assessment Programme, in addition to the knowledge and experience of the membership of the World Water Council and International Water Association.

The initiative will be unique and innovative compared with earlier water foresight studies in several ways: (i) it will include quantitative as well as qualitative scenarios supported by information generated by multi-model assessments using new generations of socio-economic and

[iv] http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/for-the-media

hydrologic models; (ii) The stakeholder-informed scenarios will be used to assess the robustness of solution options, policies and technologies, with the purpose of providing information for decision-making to deal with water issues and challenges at multiple scales in a variety of bio-physical and socio-economic settings. The scenarios will be accompanied by optional paths to achieving desirable water futures. In these paths, both autonomous and induced "solutions" will be incorporated over time, including major transitions which are likely to happen in coming years and decades in, for example, water governance and water related technologies; and (iii) the scenarios will be prepared in collaboration with major stakeholders in water dependent public and private sectors, which will significantly increase both plausibility as well as practicality of these scenarios. The inititative will elaborate scenarios with horizons of 2020, 2030, 2050 and 2100, each with an appropriate degree of detail.

In order for the initiative to accomplish its goals, operations are foreseen to be organized into five groups: a Governing Board, a Secretariat led by the Project Director who will also facilitate the Project Group, and two stakeholder groups (a Scenario Focus Group – SFG, and a Sector Actors Group - SAG). The Governing Board, including high-level representatives of the Initiative's partners and sponsoring, funding and collaborating agencies, is responsible for providing annual oversight and review. The Secretariat, based at IIASA, will provide strategic coordination, and administer funds. The Project Group will support the scenario development, both qualitatively and quantitatively, identify robust solutions, provide relevant sector and modeling expertise and analysis, and communications. The Scenario Focus Group, a representative group of decision makers, will develop the scenarios, ensuring their relevance, plausibility, and legitimacy. The Sector Actors Group will enrich the scenarios by grounding them within sector perspectives (including private sector and industry), better ensuring their implementation feasibility. The relationships are shown in Annex 1.

METHODOLOGY AND PROCESS

The process being followed is an iterative one of building qualitative scenarios and constructing and applying simulation models, in which the SFG engages scenario experts, stakeholders, data experts, modellers and decision-makers. Scenarios will be chosen to be useful to all decision-makers including those at sub-global levels that present differing characteristics; for example, in terms of the degree of law and order, financial systems, or human and institutional capacity.

The process began with an in-depth analysis of the evolution of the major external forces that have consequences for water managers and a discussion of existing scenarios. This was followed by the development of summaries of qualitative 'storylines' that describe how selected primary drivers could interact as they evolve. These storylines will provide an understandable and more transparent basis for understanding scenario assumptions and a more interesting method for communicating the substance of the scenarios than numerical data by itself, and represent the complex views of the individual members of the stakeholders and expert groups, including those from countries sharing important distinguishing characteristics. These will be reviewed and modified by the SFG with input from the SAG.

Based on these summary qualitative scenarios, using the most recent data sets and models available, and taking account of the guidance of experts in each of the driver fields, modellers will prepare quantitative projections. These will provide numerical data to be used in and make possible a consistency check of the storylines. These can cover such items as demographic change, energy production and associated estimation of water requirements in households, agriculture, industry, and energy production, the calculation of water availability and flows at the watershed level, and potential gains in water-use efficiency derived from the application of different and new technologies. This part of the work would be based on existing models, engaging their builders in providing simulations specifically geared to the questions of interest for the scenarios. Multiple-model ensembles will be employed to assess the degree of knowledge and uncertainty within the modelling itself. The fact that the scenarios will be based on the opinions of experts in each of the driver fields will add credibility to their feasibility if not probability.

The process involves harmonizing the qualitative and quantitative projections through an iterative process that relies on the facilitated interaction between the SFG, the SAG, scenario writers, data and sector experts, and other stakeholders. The interactive process encourages communication and discussion among these different actors.

During the process the team would also examine cases that are representative of different conditions. These could then be taken into account in refining the global scenarios and modelling them. A typology could thus be developed of situations or classes of countries sharing common issues to assess scenario boundary conditions during the later survey exercise we will conduct with representative actors and decision-makers. These typologies will then lead to the identification of combinations of options that are effective and robust under the conditions faced.

At the national and sub-national levels (river basin level scenarios and urban scenarios represent an especially relevant instance of the sub-national scale), the same general approach applies, with the difference that the scenario construction process, and the scenario findings, can be more directly related to the particular circumstances and characteristics at these levels and connected to the actors and decision-makers there, thus gaining in realism and usability. In those cases, the global scenarios can serve as suggesting a general direction and providing a perspective for the national and sub-national scenarios.

Such sub-global scenario exercises initially would be carried out in a few selected countries and trans-boundary river basins where there is an effective water management strategy or national water management plan; where data on water-resource quality, quantity and uses and economic and social development are available to construct useful indicators; and where there is an expression of interest and a willingness to work with and contribute to the scenario development process.

At the trans-boundary, national and sub-national levels, the establishment of good communication systems among the groups preparing scenarios will stimulate exchange of experiences, mutual learning and reciprocal capacity-building. The development of a scenario tool-box and training material by the Secretariat to be made available to the interested scenario groups would facilitate the task and increase comparability of the efforts. These would include tools to assess the

applicability, visibility and sustainability of options presented by the scenarios or to develop appropriate local scenarios.

The progress of the initiative would be presented at Stockholm World Water Weeks, COPs, and other relevant, high-level forums. As stated earlier the global and some regional scenarios will be presented at the 7th World Water Forum in Korea in March or April 2015. At its completion the initiative will have established a network involving information exchange, mutual learning and horizontal cooperation to connect teams of researchers and decision-makers exploring the scenario approach at national and sub-national levels, along with an appropriate self-organizing Internet site for interactions and exchange of experiences. A toolbox will reflect learning during the scenarios and options analysis process and include some software tools (for example, a description of options more likely to be valid in countries sharing important distinguishing characteristics). It would also contain links to tools not used in this process but in similar work. Regional multi-purpose workshops (ECA, MENA, Africa, East Asia, South Asia, LAC, SIDS) could present the global scenarios to government leaders, the private sector and civil society, as well as deliver specialized training in water scenario building to water managers and other stakeholders.

TIMELINE (tentative)

The draft timeline for the initiative includes the following key dates:

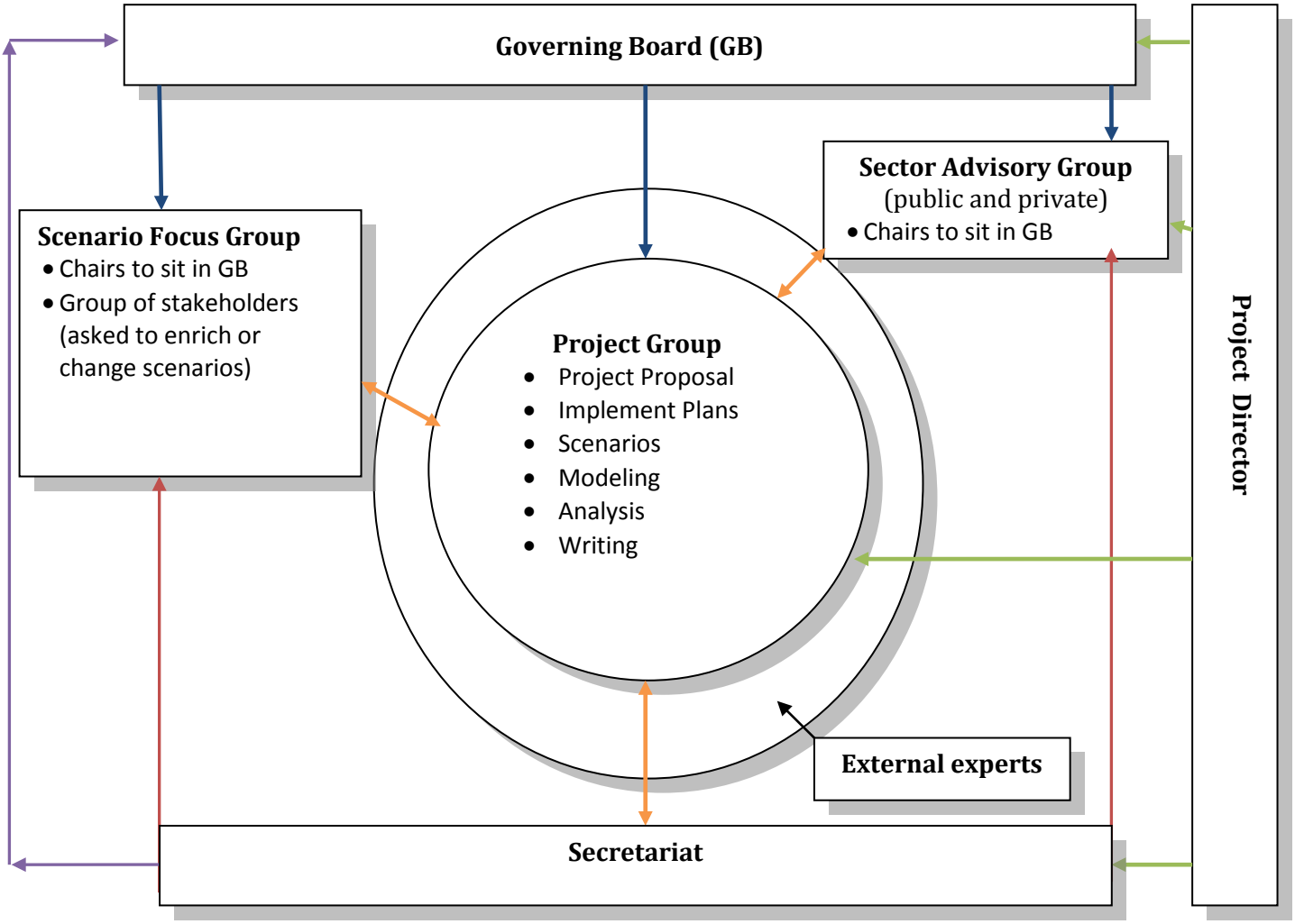
2013 February 4-5	Project Launch Meeting of High-Level Delegates
2013 May 6-8	Meeting of full Project Group (including external members and what regional leads have been identified at this point)
2013 May 13-15	First meeting of initial Governing Board at World Water Forum 7 Launch Meeting in Korea
2013 June 17-21	First meeting of SFG and SAG (stakeholder groups)
2013 October 8-11	Second Meeting of initial Governing Board at Budapest World Water Summit.
2013 December 2-6	Second meeting of SFG and SAG
2014 November	Third meeting of Governing Board, SFG and SAG
2014 December	Global and regional quantified scenarios completed
2015 Summer	Report on the first phase of the project published; 7th World Water Forum, Korea.

The dates for the remainder of the initiative will be detailed at a later stage, with a targeted completion date for the project 2016-12-31.

BUDGET

The estimated total cost of the initiative is about €7 million, of which about €3,4 million for the first phase which will culminate at WWF 2015.

Annex 1: Structure and Relationships in World Water Scenarios Initiative



Governing Board

Purpose:

The Governing Board plays a strategic advisory role, providing oversight and a review of the work plan and budget for the initiative, as well as monitoring targets and priorities. The Governing Board provides a forum for constructive exchanges and ensures the Scenarios Initiative is directed in a way that addresses the needs and interests of a broad cross-section of decision makers. Moreover, the GB will play a critical role in outreach and dissemination.

Activities:

The Governing Board will:

- supervise and review the initiative regarding strategic decisions and scope;
- facilitate outreach to key high-level stakeholders;
- review the work plan and agree to the timeline and budget;
- promote and communicate the initiative in relevant venues and settings; and
- represent the initiative at key international events.

Composition:

The Governing Board will be primarily composed of the high level representatives of the sponsoring and funding agencies of the initiative, representing the industrialized, emerging, and developing world.

Scenario Focus Group

Purpose:

The Scenario Focus Group (SFG) is an essential part of the initiative. It is a representative group of stakeholders whose role is to provide guidance to ensure the global and regional relevance and legitimacy of the scenarios.

Activities:

The SFG will meet physically on three occasions, and will interact electronically the rest of the time. Specifically, the SFG will:

1. reflect upon and discuss the scenarios prepared by the Project Team with input from the Sector Actors Group (SAG), and enrich them or change them if considered appropriate through an iterative process between the SFG, SAG and the Project Team; and
2. identify the essential attributes of a desirable global water future (to be developed technically by the Project Team and submitted to the SFG).

The SFG chairperson will sit as an ex-officio member of the Governing Board of the initiative to report about the deliberations of the SFG. The Group may define additional internal structures (i.e., rapporteur, specialized committees) as needed and justified by the size and complexity of the issues. The Group will receive support from the Project Team and the Secretariat (facilitation of the meetings, summaries of available information, driving forces report, circulation of scenario drafts, outputs from models, logistic support, etc.)

Composition:

The Group will be composed of broad-vision policy- and decision makers at different scales (from international water organizations to local water managers). While maintaining a primary water focus, the Group will also address issues important for the solution of water problems across a multitude of water-related sectors, such as energy, agriculture, environment, and development.

The total size of the SFG will be about 20 persons. It will be supported by the Project Team and Secretariat, who will participate in the discussions.

Sector Actors Group

Purpose:

The quality and use of the scenarios will benefit from the input, integration, and buy-in from sector actors. The Sector Actors Group enriches and grounds the world water scenarios by providing a range of sector perspectives and considerations during their development.

Activities:

The role and scope of the Sector Actors Group on the Scenarios Initiative includes:

- direct support of the development and revision of the global-scale water scenarios (two revisions in parallel with the SFG), including:
    - providing input on water requirements, cost considerations, technology, and management in different sectors,
    - consideration of the role of the private sector,
    - provision of information on when technology can come into play and the limitations of the technologies,
    - provision of a reality check on the scenarios and proposed solutions, and
    - examination of trade-offs between water use priorities;
- direct support of the development of the consensus Global Water Vision;
- assessing the impact of different options on the sectors represented.

The work will be supported by the Scenarios Project Team and the secretariat.

Composition:

The membership of the group will contain a mix of relevant sector experience and expertise including public and private sector representatives from high priority water users such as energy, health, agriculture, food, environment (i.e. biodiversity and ecosystems), urban and industry. The members will also include representatives of the water-related industries and technologies, focusing on water innovations and solutions.

There will be between 10-20 members in the group.

Project Team

Purpose:

The Project Team is tasked with carrying out and documenting the scenario development (both qualitative and quantitative), identifying robust solutions, and modeling and assessment work, based on the strategic direction provided by the Governing Board, and the substantive inputs from the Scenario Focus Group and Sector Actors Group. The Project Team ensures that the scenarios present an integrated, coherent and complete analysis of the issues and options, and are consistent with state of the art science. This will lead to some key outputs of the initiative, which are proposals for flexible and robust solutions which will themselves be developed in coordination with the SAG and SFG. The work will be performed at the global level as well as for a selected number of regions/basins or countries, including support for associated initiatives.

These tasks will then be organized according to the following categories, or work packages:

1. Development of qualitative scenarios: This task involves content support and process facilitation of the meetings of the Scenario Focus Group and the Sector Actors Group to efficiently communicate and elicit information and feedback. Those working within this task must also communicate the results and findings from the teams working to quantify scenarios and develop robust solutions back to the SFG and SAG. This task also includes the development and analysis of qualitative scenarios based on discussions with these groups. The work will be carried out by researchers with experience in scenario development and scenario processes from sectors associated with the main driving forces and of facilitators with expertise in stakeholder driven processes.
2. Preparation of quantitative scenarios: To the extent possible, qualitative descriptions (narratives) of indicators and drivers coming out of the Qualitative Scenario Development task will be translated into quantifiable indicators and variables for analysis by the mathematical models that are relevant and useful to the various water-related sectors. This work package serves as an intermediary between the qualitative scenario development and hydrologic and water resources modeling. Researchers in this work group are responsible for analyzing historic trends in indicators of the driving forces, future projections of trends in these indicators (both those existing and developed by the modeling task), and the feasibility and uncertainty of changes, rates of change, and critical values of the indicators. They are responsible for clearly communicating the trends and limitations to both the scenario development and modeling teams, as well as to the outside world. They also help explore the quantitative impact of solutions proposed by other teams.
3. Modeling: The modeling team will develop, adjust, coordinate, run, and analyze the set of hydrologic, sector, and integrated qualitative and quantitative assessment methods and models used to fully assess both the current state, where necessary, and the scenario trajectories, as well as the impact of proposed solutions. The modeling will be done with multiple models and methods to produce multi-model ensembles and assess model

uncertainties. The modeling team will agree to common driving datasets to use in the modeling and coordinate closely with the indicator and qualitative scenario teams. Modeling will be done iteratively with scenario development to refine both the models and scenarios. Input and output datasets for analysis will be made available both within the initiative and to the public where possible.

4. Uncovering solutions: Through the analysis of the qualitative and quantified scenarios, this task will research, analyze, and communicate possible robust political, managerial, and technological solutions to deal with the future change, variability, and uncertainty. It will employ backcasting as a technique to explore strategies to reach a desirable future. It will find ways that the data, modeling and knowledge of the initiative can be used effectively for decision support. This group will provide feedback through the scenario development task to the Scenario Focus Group and Sector Actors Group, so they can further enrich the scenarios and contribute to solutions. It will also provide information on suggested solutions to the quantification and modeling teams, so that those teams can test some solutions and provide feedback.
5. Communication and dissemination: Stakeholder processes and distributed, networked projects are built upon effective communication, both among the initiative's teams and between the initiative and the outside world. The initiative cannot be relevant or useful unless the knowledge brought together and produced can be made available and used for better decision making in water resource management. This Work Package is responsible for developing and implementing that communication strategy with feedback from the secretariat. It will assist members of the initiative by providing information and making suggestions on good communication skills within the initiative, employ communications technology to assist communication via online collaboration tools, and will produce consistent sets of materials, publications, websites, databases and toolboxes, taking advantage of any other technologies and opportunities that help disseminate the scenarios, tools, and solutions developed by the initiative.

Composition:

The Project Team will consist of full-time and part-time researchers and modelers, external advisors, and communications specialists, experts in the fields and sectors described in the tasks of the Project Team.

Secretariat

Purpose:

The secretariat provides strategic direction and will coordinate and administer the initiative. The secretariat is hosted by IIASA, and is responsible for all money management (budget), which will be executed by the Project Director under the direction of the Governing Board.