

## Brief No. 1

# WATER SECURITY AS A DEFINING 21ST CENTURY CHALLENGE.

January 2012

David Grey &  
Dustin Garrick

Oxford University School  
of Geography and the  
Environment

## KEY MESSAGES

### **Water security defined.**

Water security is defined as a tolerable level of water related risk at any scale and for any actor.

### **Water security: past, present and future.**

The quest for water security has been a struggle throughout human history. Life for the poor today is in part defined by the precarious struggle for water security.

### **Water security and society.**

Water security includes every interaction between society and water, without exception. It is constructive to consider water security in terms of three dimensions: multiple values of water, scale and actors. Risk connects these three dimensions.

### **Case for science.**

There is an unprecedented need for cutting-edge research to mitigate water security risks. The opportunity to provide the robust evidence base necessary for effective policy, planning and practice has never been greater, due to advances in science and technology.

### **Case for government and civil society.**

Water security has risen on the policy agenda for government and civil society. Because costs are high and budgets constrained, strengthening the knowledge base for sound decision-making promises high returns on investment.

### **Case for business.**

The risk to business is too high to ignore and the opportunity for business to inform and influence policies that reduce risk has never been greater. Yet the connection between science, policy and enterprise – essential for risk mitigation – is weak.

### **The global case.**

Historically, the perceived scale of water security was primarily local – typically the human settlement. Because of these interdependencies, water security must also be considered at the global scale. We share one blue planet and a water secure world is a stable world.

### **Water security, risk and society: a shared research agenda.**

In April 2012, the Oxford conference on Water Security, Risk and Society will convene thought leaders in the academic, policy, and business communities.



# WATER SECURITY, RISK & SOCIETY

Water Security as a Defining 21st Century Challenge

**BRIEF No.1**

## 1

### WATER SECURITY EXPLAINED

#### Water security defined.

Water security is defined as a tolerable level of water related risk at any scale and for any actor. Water insecurity refers to the converse, where the level of risk is not tolerable. Such risks include those associated with access to water, e.g. for water supply and sanitation, irrigation, industry and ecosystem services, etc.<sup>1</sup>, and those associated with water-related shocks, e.g. from drought, flood, contamination and terrorism events, etc. Water security describes a condition that has always been and remains a fundamental societal objective, It is not a new idea, approach or process.

#### Water security: past, present and future.

The quest for water security has been a struggle throughout human history. Life for the poor today is in part defined by the precarious struggle for water security. Absent or unreliable water and sanitation services, unpredictable floods and droughts, and degraded ecosystems threaten the lives and livelihoods of a third of the world's population. Rapid change – in populations, economies, geopolitics and, significantly, climate – will make achieving water security by countries that are currently water-insecure much more difficult, and could threaten the water security of long-secure nations. Escalating water demand, deteriorating water ecosystems, intensified flood and drought shocks, and related social tensions are all predicted. The potential costs, in terms of human suffering, sustained poverty, constrained growth, migration, and social unrest could be high.

#### A STORY OF THREE FLOODS: WATER SECURITY THROUGH THE EYES OF THOSE AFFECTED

Severe flood events have captured international attention in 2010 and 2011, demonstrating the profound impact of water insecurity and risk for people and society at every scale. Two thousand lives were lost and 20 million people displaced in the major floods in Pakistan during the 2010 monsoon; with the 2011 monsoon causing more loss of lives and livelihoods coupled with economic losses in a nation struggling to recover. Five hundred lives were lost during the 2011 Thai floods, with 750,000 uninsured, poor homes damaged and insured losses of at least US\$ 20 billion, including the closure of multinational electronics and vehicle industries, with impacts cascading through the global economy. Thirty five lives were lost in the January 2011 Queensland floods, with Brisbane inundated, 200,000 people affected, and Australia's GDP reduced by an estimated US\$ 30 billion. These three events are linked by the common thread of water security, showing that all economies are vulnerable to some extent, despite infrastructure and institutions designed to buffer risks.

1 Grey, D. and Sadoff, C. (2007) Sink or swim? Water security for growth and development. *Water Policy*, 9(6): 545-571.

UN Photo/WFP by Amjad Jamal



*Monsoon floods in Pakistan, 2010. Victims of the worst floods to hit Pakistan in several years walk through water-filled streets in the northwestern city of Nowshera. The flooding has caused the loss of 2,000 lives and affected 2.5 million people, including Pakistan's large population of Afghan refugees.*

## 2

# WATER SECURITY, RISK AND SOCIETY

---

### Water security and society.

Water security includes every interaction between society and water, without exception. It is constructive to consider water security in terms of three dimensions. The first dimension is that of the multiple values of water. Water is both productive and destructive. The productive values of water include domestic and industrial supply, sanitation, food, ecosystems, energy and transport. Water also has intrinsic cultural and spiritual values. Destructive impacts of water include risks associated with contamination and disease, unpredictable droughts and floods, landslides and terrorism. The second dimension is one of scale. Water security affects society from the individual to the community, city, nation, region, basin and the globe. The third dimension is one of actors and their values at all scales. This includes individual and collective values in both private organisations (e.g. farms and firms) and formal and informal public (e.g. government and community) institutions. Risk connects these three dimensions.

### Water security and risk.

Eighty percent of the global population confronts high levels of threat to water security.<sup>2</sup> Highly variable rainfall and runoff ('difficult

2 Vörösmarty, C. J., McIntyre, P. B., Gessner, M. O., Dudgeon, D., Prusevich, A., Green, P., et al. (2010). Global threats to human water security and river biodiversity. *Nature*, 467, 555–561.



*Floods in Queensland, Australia, 2011. Thirty five lives were lost in the Queensland floods, with Brisbane inundated, 200,000 people affected, and Australia's GDP reduced by an estimated US\$ 30 billion.*

hydrology') creates significant risks of water insecurity and is costly and complex to manage. High variability correlates with poverty. Many poor countries face great risk but have the least ability to mitigate such risk.<sup>3</sup> The poorest live in the most vulnerable areas, such as slopes and floodplains, yet have the least capacity to invest in resilient construction to mitigate risk. Private investors are risk averse, crowding in investment where water security is achieved. Climate change is projected to exacerbate existing challenges due to increased variability and incidence of water shocks, which will especially strain those regions with lower capacity to adapt. Recent events illustrate that these risks are not being effectively mitigated by science, government or enterprise.

3 Brown, Casey, Robyn Meeks, Kenneth Hunu, and Winston Yu. 2011. Hydroclimate risk to economic growth in sub-Saharan Africa. *Climatic Change* 106 (4) (JUN): 621–47

## 3

# WATER SECURITY: MAKING THE CASE

---

### Case for science.

There is an unprecedented need for cutting-edge research to mitigate water security risks. Research is needed within multiple disciplines, including social, physical, economic, engineering and medical science, coupled with problem-based interdisciplinary research. The opportunity to provide the robust evidence base necessary for effective policy, planning and practice has never been greater, due to advances in science and technology. This includes advances in data acquisition and analysis and the growing ability to communicate findings of science.



*Flooded toll gate on a motorway in Bangkok, during monsoon floods in Thailand, 2011. Severe monsoon floods which began in July and continued until December inundated Bangkok and several provinces in Thailand. The flooding caused the loss of 500 lives, insured losses of at least US\$ 20 billion and damage to 750,000 uninsured, poor homes.*

## 5 WATER SECURITY: MOVING SCIENCE FORWARD

### Case for government and civil society.

Water security has risen on the policy agenda for government and civil society. Governments need predictive capacity and support for decisions on the institutions, infrastructure and information investments essential to enhance water security. However, water is almost always divided between multiple agencies, making priority setting and coordinated action difficult. Knowledge gaps and considerable uncertainty pose a serious challenge for sound policy and can lead to misperceptions and political tensions, particularly within and between water insecure countries. Tradeoffs inevitably need to be made. The social and political risks inherent in doing so are best mitigated by engaging civil society. Because costs are high and budgets constrained, returns from investment in generating the knowledge base for sound decision-making are potentially very high.

### Case for business.

The World Economic Forum 2011 global risks study identified water insecurity as one of the world's greatest threats with a \$400 billion annual 'risk to business'. The costs of recent water-related shocks in emerging economies have sent price shocks through the global

economy. The risk to business is too high to ignore and the opportunity for business to inform and influence policies that reduce risk has never been greater. Yet the connection between science, policy and enterprise – essential for risk mitigation – is weak.

### The global case.

Historically, the perceived scale of water security was primarily local – typically the human settlement. Over the past century, the nation state and the river basin within it have become the scale at which water security is sought, providing greater potential to manage the risks of variable systems and associated tradeoffs. Only in recent decades have river basins beyond the state become a potential unit of risk management and mitigation, although sovereignty remains a fundamental principle. However, the water cycle is a global flux, which is inextricably linked with the flux of carbon and nutrient cycles. Water is traded globally in foodstuffs, energy and other commodities. Local water insecurity and commodity production inefficiencies can now have global impacts. Because of these interdependencies, water security must also be considered at the global scale. We share only one blue planet and a water secure world is a stable world.

### Water security, risk and society: a shared research agenda.

In April 2012, the Oxford conference on Water Security, Risk and Society will convene thought leaders in the academic, policy, and business communities who are concerned by water security challenges.<sup>4</sup> The objectives are to map research priorities and to lay the foundations of a shared agenda and of a partnership of science, policy and enterprise institutions. Oxford and its partners from world-class institutes around the world are committed to building the evidence base for strategic action and to engaging policy and business leaders in ensuring its relevance. The symposium is shaped by two themes: (1) defining and measuring water security in terms of multiple risks, scales, and values and (2) identifying pathways to water security, including innovative investments in institutions, infrastructure, information and incentives. We hope to work with you in Oxford in April 2012.

<sup>4</sup> International Conference on Water Security, Risk and Society, University of Oxford, April 16-18 2012, See: [www.eci.ox.ac.uk/watersecurity/](http://www.eci.ox.ac.uk/watersecurity/)