UNDP

Empowered lives.
Resilient nations.

LSE SOUTH ASIA CENTRE

Colombo Development Dialogues 2

WATER SECURITY AND CLIMATE VARIABILITY

31 AUGUST 2018

SUSTAINABLE DEVELOPMENT GOALS

IN PARTNERSHIP WITH

Dilmah *For lovers of tea*

citra social innovation lab SRI LANKA

WATER SECURITY
AND CLIMATE VARIABILITY

31 AUGUST 2018

Table of Contents

Executive Summary

The second edition of the Colombo Development Dialogues focused on 'Water Security and Climate Variability'. The panel brought together a range of individuals from the government, private sector, development agencies, and academia, to provide expert interventions on various aspects of water security. The panel was complemented by five pre-identified Discussants, who provided additional perspectives and evaluations of the panellists' comments to facilitate further questions and discussions. As such, perspectives on institutional arrangements around water in Sri Lanka, the pricing of water and agricultural foods, the different implications of water security for women and men, the role of the private sector, and data-driven solutions for resilience were discussed and debated during the course of the event.

Panellists and Discussants

The panel was moderated by Dr Nilanjan Sarkar, Deputy Director, South Asia Centre, London School of Economics and Political Science.

PANELLISTS

Prof J. A. (Tony) Allan, Emeritus Professor, Department of Geography, King's College London

Dr Giriraj Amarnath, Research Group Leader (Water Risks and Disasters), International Water Management Institute

Dr Soumya Balasubramanya, Senior Researcher (Environment and Development Economics), International Water Management Institute

Dr P. B. Dharmasena, Visiting Lecturer, Rajarata University of Sri Lanka, and until recently, National Consultant (Agriculture and Water Management), Food and Agriculture Organisation (FAO) Sri Lanka

Dr Timotheues Gaasbeek, Expert in International Water Resource Management, Specialist in Water Security and Climate Variability in Sri Lanka, and until recently, WASH Advisor for ZOA, Sudan

DISCUSSANTS

Mr Sydney Gajanayake, Chairman, Water Resource Board of Sri Lanka

Ms Dilrukshi Handunnetti, Consulting Editor, Daily/Weekend Express & Global WASH Media Award Winner 2014

Ms Shiranee Yasaratne, Advisor, Biodiversity Sri Lanka

Ms Tharuka Dissanaike, Policy and Design Specialist (Environmental Sustainability), United Nations Development Programme (UNDP) Sri Lanka

Mr Jude Kasturi Arachchi, Head of Sustainability, Jetwing Hotels

Key Findings

- The availability of water in Sri Lanka is not a concern; core water security issues lie in its management.
  - More than 50 percent of the country's rainfall goes to the sea and cannot be utilized.
  - In some dry zone regions, there are risks of sea water intrusion when using groundwater.
  - Several river basins in Sri Lanka release around 60-70 percent of their water to the sea – it is these basins that often flood.
- Sri Lanka's rainfall data indicates long-term cycles of wet and dry periods. Sri Lanka is currently in a wet period, soon to be followed by a dry one. Given that irrigation schemes are designed using the previous 3 decades' worth of data, recent schemes in the country, built in the 1970s, used data from a previous wet period, proving ill-suited to accommodate dry periods thereafter.
- Changes in rainfall patterns between regions of the country may be a result of changes in land use, although this would need to be further studied. Such changes in rainfall patterns have resulted in climate-induced migration in the North and North Central regions, due to its unpredictability affecting dependence on agriculture as a livelihood in those areas.
- Both in the Sri Lankan context and globally, food systems provide under-priced food, leading to farmers being underpaid and unable to invest in their crops and water, given that it is the farmers that manage water in irrigation and rainfed systems.
- The involvement of women in agriculture is severely underreported, with data indicating that 33 percent of women are employed in agriculture and that 40-50 percent of the agricultural workforce is female. Furthermore, migration trends indicate that men are now more likely to migrate for work than previously, which could have further implications on the number of women in the sector. In addition, contrary to popular belief, women undertake many technical tasks in agriculture, including irrigation on paddy fields and non-rice crops.
- The Government of Sri Lanka has facilitated two large programmes on water with development agencies in the recent past, one of which focuses on using climate-smart technology to address climate variability. However, there is space for intervention on integrated urban water management, as well as using innovative solutions around data and systems to improve resilience.
- Sri Lanka has 10 ministries with portfolios related to water and more than 20 departments dealing with water resource management and does not have an overarching policy on water use and management.
- While the private sector is becoming more aware of water and climate risks and has been increasingly exposed to the SDGs and global sustainability agendas, there are still issues pertaining to Sri Lanka experiencing a commodification of water and the industrial sector extracting water irresponsibly, given a lack of policy and regulations on water management.
- Despite progress in access to safe drinking water and sanitation in Sri Lanka, one third of households in the estate sector still need to walk out of their households to access water. Pockets of such deprivation regarding water and sanitation also exist among the displaced, and access to sanitation in schools remains a critical issue.

Recommendations

Institutions and policies governing water

- The responsibility for water management should lie within one institution with the ability to undertake high-level decisions on water uses, measures to alleviate disparities in water resources, and respond to water-related disasters.
- An apolitical coordination body, operating at the national, district and DS levels and involving all stakeholders, including farmers, the private sector and water users, would allow both top-down and bottom-up flows of information. Such stakeholders should work together to identify solutions for catchment areas on a consensus basis. Better coordination and partnerships involving people from different areas of expertise will also serve to lessen the disconnect between the solution itself and 'softer' aspects that influence the effectiveness of the solution designed.
- A water policy needs to be formulated and effectively enforced, given that there are multiple agencies responsible for portfolios involving water. This policy should lay out short- and long-term objectives and provide a clear blueprint for all departments. Policies to regulate the utilization of groundwater based on different aquifer types, as well as strict regulations on the contamination of water, are also required.
- As a longer-term intervention to mitigate climate variability, such as the switching of rainfall patterns between Colombo and Nuwara Eliya, reversing changes in land use could contribute towards restoring climate patterns to their previous state – for example, enabling reforestation in the hill country.

Designing water systems

- To mitigate risks of water-related disasters, reservoirs should be constructed at the centre of river basins, once systematic procedures, such as feasibility studies, have been executed. Moreover, given issues around groundwater contamination and salinity, the government should consider building more surface reservoirs, instead of focusing on replenishing and storing groundwater. Sri Lanka's indigenous cascade systems should also continue to be rehabilitated, as they have proven effective.
- In the face of long-term cycles, design standards should accommodate longer time series data, to allow a more realistic picture of what to expect, to reduce their vulnerability to droughts and excess rainfall, and thus reduce the impact of climate variability on food production.
- There is a clear need for integrated urban water management, not just through flood models or embankments to divert water, but by looking at overall urban water, land use, urban cropping, etc.
- Sri Lanka should work towards climate screening tools that consider land, water and ecosystems holistically, where projects are cleared and implemented based on risk levels - if the project involves a higher risk level, given climate variability, more innovation would be required to proceed.
- There is value in looking towards comparative experience in designing solutions to cope with water-related disasters. For instance, the building of sub-surface systems in India, Bangladesh and Thailand, which allow for excess floodwater to be diverted to several points in irrigation or rain-fed systems, which could then be stored and used during dry seasons or droughts.

Agricultural planning and pricing

- The virtual water of crops imported and grown in the country should be considered during agricultural planning, to determine which crops should be prioritized, and which should be grown instead of imported, depending on water consumption.
- The seed varieties used by farmers are often not up-to-date with current climate and crop growth models, based

on which seed varieties have been developed to optimize the use of water. Bangladesh, for instance, has started growing an improved, flood-tolerant rice variety, resulting in at least 60 percent of its yield remaining intact following floods.

- There is a definite need to increase agricultural prices, although challenges lie in the process of doing so, making it politically feasible, and communicating such ideas effectively to both consumers and farmers. The government needs to balance providing consumers with under-priced food and paying farmers properly to enable them to invest in their crops and water, thereby rendering them less susceptible to dry spells and floods.
- Decisions made on pricing water must be accompanied with improvements in service delivery, as well as potential caps on usage to ensure sustainable use.
- If private firms are making products/services that use a significant amount of water or pollutes it, this should be incorporated into the price of the product and passed on to consumers. While this is more complicated in the case of water as a public good, where easily executed and final clients are agreeable, the government should certainly incorporate the same principle.

Data for water

- It is essential that disaggregated microdata, both in terms of location (at the village level, ideally) and gender, is collected, and used to design evidence-based policies for water, given that variability and vulnerability changes from location to location, as well as between women and men.
- Solutions involving big data, remote sensing information and drone data are available, and should be integrated into existing systems, bundled, and made available to relevant stakeholders, ranging from policymakers to farmers, to ensure that water security is mainstreamed into upstream and downstream practices.
- Moreover, there is a need to consider different types of data for different purposes – for instance, precise, high quality data may be needed to generate projections on climate change/variability, but a device collecting data to prepare households for evacuation can allow for data with a higher margin of error. Such nuances should be considered to develop mixed strategies for data, infrastructure and systems that are sufficiently flexible to allow for challenges associated with climate variability.

Women and water

- Training programmes should be designed to invest directly in women's capabilities and capacities, given recent migration trends and a non-neutral diffusion of information along gender lines. This could involve re-locating training nearer to villages, child-care facilitates, etc.
- Interventions to reduce efforts to secure water, such as rainwater harvesting systems, should be focused on, given disproportionate impacts on women in rural areas. However, such interventions need to incorporate sufficient flexibility in design, to hedge against climate variability.
- Relief programmes should expand to cover damage to homestead plots where vegetables are grown in small quantities for both consumption and petty cash, as they add up to a substantial economic cost.

An Overview of Water Security Issues in Sri Lanka

Dr P. B. Dharmasena began by stating that water availability in Sri Lanka is not a problem, and that core water security issues lie in the management of water resources. The island receives significant rainfall, with an annual average of around 2,000mm of rain; however, more than 50 percent of the water goes to the sea and cannot be utilized – examining the possibility of limiting this is critical. He also noted that in some dry zone regions, such as Mannar and Jaffna, there is a risk of sea water intrusion when using groundwater; around 30 percent of cultivated land in Jaffna is affected by salinity.

Sri Lanka has 103 river basins, of which 16 are significant in terms of area and volume of the water body. There is considerable variation in how much water is released to the sea by each river – some rivers, such as Kala Oya, Yan Oya and Malwathu Oya, release less than 20 percent of its water, while others, such as the Kelani Ganga, Gin Ganga and Kalu Ganga, release 60-70 percent. It is the latter type that floods, whereas the former is often home to several reservoirs. Dr Dharmasena stated that risks of floods and droughts could be minimized if river basins were better managed – if reservoirs are constructed towards the middle of river basins, rather than upper regions, this would prove an effective solution.

Dr Dharmasena noted that Sri Lanka has a long history of water management, calling it a "water civilization". There are examples of effective water management models implemented in the past – for instance, the construction of giant canals to divert water from one river basin to another, to compensate for deficits. In addition, 1,162 clusters of tanks, or 'tank cascades', have been identified in the North and North-Central, North-West and Southern regions of the country, which must be rehabilitated to ensure water security. He indicated that these cascade systems do not solely have applications in agriculture and irrigation, but serve as ecosystems that ensure water availability for people and the environment alike.

Climate Variability in Sri Lanka

Dr Timmo Gaasbeek noted there has been much conversation around climate change, with Sri Lanka falling prey to more dry spells, heavier showers and bigger floods. However, he stressed the importance of examining the country's rainfall time series data, which indicates long-term cycles of dry and wet periods. Effective water management requires a sound understanding of water availability. If, structurally, there are periods of lower water availability due to less rain, and if systems have been designed based on estimations of higher rainfall, then such systems would be rendered ineffective. Similarly, if systems are designed based on lower rainfall estimates, this would lead to extra flooding that the country cannot cope with.

Dr Gaasbeek postulated that Sri Lanka is currently in a wet period, which will be followed by a dry one. He argued that while many explanations of rainfall patterns in the country look to El Nino, it doesn't explain the long-term cycles observed. He stated that he knows of only one other cycle following a similar pattern, based in the ocean between Greenland and Iceland. As this area cools, this changes wind patterns over the Atlantic, with rain not falling over England, but getting pushed towards Scandinavia. As this wind cools and curls into low pressure areas in Africa and China and India, this contributes towards pushing rain further south. The mechanism behind this is not fully understood yet, however. He then posited that another cycle of this nature involving the cooling of the North Atlantic region could well result in less rain for Sri Lanka.

Elaborating further on the impact of climate variability on the hill country, Dr Gaasbeek stated that Nuwara Eliya is getting less rain and Colombo is getting more, with water that used to fall in the former area during the South-West monsoon now falling in the latter. He suggested that this may have to do with changes in land use, given that over the past 150 years, the hill country changed dramatically from forests to a combination of plantations, villages, towns and fields, which impact environmental conditions differently, in terms of evaporation, cooling the air and how much run-off is generated - this in turn could affect where rain falls. However, he noted that this link needs to be further studied and verified, after which measures should be taken to address it.

Dr Gaasbeek added that irrigation engineers are trained to use the last 30 years of data when designing systems.

For instance, recent irrigation schemes in the country were built in the 1970s, using rainfall data from 30 years prior, which was a wet period. Rainfall subsequently reduced, reducing the effectiveness of the systems built. He thus noted that in the face of long-term cycles, design standards should be changed to accommodate longer time series data, to allow a more realistic picture of what to expect, to reduce the vulnerability of such systems to droughts and reduce the impact of such climate variability on Sri Lanka's food production.

Virtual Water and Sri Lanka

Prof. Allan stated that about 160 out of 210 countries are net importers of food, and in doing so, they are net importers of other countries' water. This 'virtual water' is 'imported' by the water-scarce. Other nations are prepared to send food to importing countries often at a cost much less than the cost of production. International cereal prices do not reflect the externalities related to damaging the water environment of the exporting country – such food is under-priced. Prof. Allan defined 'food water' as the water needed to produce food, as opposed to water for industrial or domestic use. As a net importer, albeit a small one, Sri Lanka needs to understand international positions and trends (for example, that food prices have been falling since the 1800s) and recognise that food security depends on the global system as a whole, as well as on the sound management of Sri Lanka's internal water.

Prof. Allan touched on the idea of a 'water footprint', which reinforces the concept of virtual water and has now been mainstreamed into the conversation around water security. He suggested that a possible solution lies to a major extent on the development of more responsible food trade and consumption practices. He noted that the water footprint for heavy meat-eaters – about 5,000 litres per day – is roughly twice as much as the daily water footprint of vegetarians. He also pointed out that while irrigation systems are designed by engineers, the freshwater (blue water) in them is managed by farmers on a day-to-day basis. Farmers manage all the (green) water in rainfed systems, which account for over 70 percent of food production by tonnage. It is a political imperative that the food system provides affordable food. Our global food system provides under-priced food for underpaid people. Because food is under-priced, farmers have very difficult livelihoods and cannot invest in ways that would enable them to provide effective production and environmental stewardship services. Dr Gaasbeek agreed that if Sri Lanka wishes to make itself less vulnerable to dry spells and floods, it will need to balance the need to feed people with under-priced rice and paying farmers properly, to enable them to invest in their crops and water.

Dr P. B. Dharmasena drew on Prof. Allan's concept of virtual water to illustrate differences in the water consumption of the various crops currently grown in the country – for instance, while it is generally assumed that rice is the most water consuming crop, the virtual water of tea is more than twice that of rice. Dr Dharmasena proceeded to compare the virtual water of crops grown in the country and those imported, demonstrating the need to consider virtual water in agricultural planning, in determining which crops to be prioritized and which crops to be grown instead of imported, depending on water consumption.

Water and Gender in Sri Lanka

Dr Balasubramanya began by noting that water security and climate variability have different implications for men and women, before proceeding with four ideas to make water security more gender-inclusive in Sri Lanka:

1. Tackle persistent myths by collecting gender-disaggregated data, particularly microdata, to be used to design evidence-based policies for water. Such data should allow a better understanding of how men and women use resources, are affected by changes in resource bases and policies, and how they spend their time in different economic sectors. It is important to collect time-series data, as the roles of men and women often do change. For instance, in the North and East, communities have switched from drawing water from wells to using pumps, which has reduced women's efforts. However, with the rise of chronic kidney disease, many alternatives to groundwater have been deployed, such as reverse osmosis units, which may result in women having to walk further to get their water – such changes in responses can easily be identified using microdata.

   The Department of Census and Statistics of Sri Lanka collects gender disaggregated data from various sectors, which indicates that 33 percent of women are employed in agriculture and 40-50 percent of the agricultural workforce is female – this suggests that the average farmer in Sri Lanka is female, which has implications for

policy and programme design. A study conducted by the Sri Lanka Water Partnership in 2016 suggested that the involvement of women in agriculture is severely underreported. Contrary to popular beliefs, women undertake many technical tasks, including irrigation on paddy fields and non-rice crops.

2. Invest directly in women's capabilities and capacities. Female-headed households in Sri Lanka have increased from 17 percent to almost 25 percent for various reasons, including changes in patterns of migration. Previously, females were more likely to migrate as domestic household help to the Middle East, but men are now more likely to do so, often as unskilled workers. This has implications for designing agricultural and community-based water management programmes, especially extension programmes; traditional agricultural extension programmes rely on training men, who are expected to train women, in turn. Training men may no longer be sufficient if men are no longer as present in the sector, thus calling for directly investing in women. This is further supported by the fact that information does not diffuse neutrally along gender lines – men are more likely to talk to men, and women to women. Therefore, this will impact how training programmes are designed – for instance, bringing the programmes closer to villages, including child-care facilities, etc.

3. Reduce women's efforts and hedge against climate variability. There has been much progress in access to safe drinking water and sanitation in Sri Lanka, particularly in the estate sector. However, a third of households in estates still need to walk out of their households to get water. One popular method to reduce such efforts is investing in rainwater harvesting systems. However, noting Dr Gaasbeek's point about the variability of rainfall itself, care must be taken to design such infrastructure flexibly.

4. Improving equity in access to resources and relief in Sri Lanka. When floods and droughts affect the country, relief programmes often provide payments for the loss of staple crops, particularly rice. However, this does not consider homestead plots, where women grow vegetables in small quantities, both for self-consumption and petty cash; while these efforts are small at the household level, they add up to substantial amount. Could disaster relief programmes expand to cover such efforts?

Solutions for Resilience

Dr Amarnath stated that an important area to focus on in Sri Lanka, and the South Asian region as a whole, is vulnerability in water at the village level, as this is often assessed only at district and provincial levels. Variability changes from location to location, such that disaggregated information is crucial.

Dr Amarnath highlighted that water security must be spoken about in the context of the government, political agendas and financing. Nevertheless, he stated that the Government of Sri Lanka has been playing a big role by facilitating two large programmes by the Asian Development Bank (Mahaweli Climate Resilience Programme) and the World Bank (Climate Resilience Improvement Project), the latter of which will aim to use climate-smart technology to address climate variability, linking water hazards, human wellbeing and water quality, ecosystems, and economic development. Nevertheless, there is a clear need for integrated urban water management, not just through flood models or embankments to divert water, but by looking at overall urban water, urban cropping, etc. He argued once again that the solution lies in a holistic approach to water security.

Given the floods experienced in the Western Province over the last three years, he then noted the importance of discussing innovative ideas around data and systems as solutions for resilience. Solutions could involve big data, as well as remote sensing information and data from drones. A variety of datasets and computer models are available for application and should be integrated into existing systems. There is also a need to ensure that such systems are available to the right users and are not silo- or department-based; he argued that unless smart and bundled information[1] is made available to farmers and policymakers alike, water security elements will not be factored into bigger agendas or materialise in changes on the ground at the farmer level.

He then drew from regional examples, such as the building of sub-surface storage systems in India, Bangladesh and Thailand, allowing for excess floodwater to be diverted to several points in irrigation or rain-fed systems, which could then be stored and used during dry seasons or droughts. In terms of droughts,[2] he noted that remote sensing

1 https://doi.org/10.1016/j.crm.2018.10.001

2 http://dms.iwmi.org/

and forecasting systems should be used effectively by meteorology and irrigation departments to forecast and develop contingency plans. Improving the financial resilience of vulnerable communities through impact-based forecast financing and index-based flood insurance[3][4] are means of enabling better social protection, which could support better climate risk management and increase climate resilience by anticipating and dealing with shocks before they happen.

Discussion

Water Management and Planning

Mr Kasturi Arachchi raised a concern regarding the contamination of groundwater and water resources in the country impacting biodiversity and polluting river basins. He cited the Kelani river basin as an example of a water body catering to nearly a quarter of Sri Lanka's population and 10,000 industries. Further to this, Mr Yuansong Wei called for greater government action to protect water sources to ensure water quality, which Dr Gaasbeek stated would require significant regulation.

In the context of such contamination, Mr Sydney Gajanayake posed a question as to whether policymakers should take a short-term or long-term view for planning. Dr Allan responded by suggesting that this would depend on the problem; the easiest and most convenient solution would be virtual water imports given falling food prices, given that fixing the overuse of groundwater could take decades. Realistically, getting people to switch away from activities that damage the environment would take time, but this could be pro-livelihood if farmers are paid the correct price for food. Mr Charitha Ratwatte suggested that the under-pricing of food is also a result of the interplay between two major pressure groups that are considered vote banks – farmers and consumers. Dr Balasubramanya agreed that there is a need to increase agricultural prices, although challenges lie in what steps to take, making it politically feasible, and communicating such ideas to consumers and farmers, taking into account perceptions.

Mr Gajanayake also inquired if water recharging is important, in response to Dr Dharmasena noting that run-off to the sea is very high. Dr Dharmasena responded that in certain dry zone areas, recharging water is difficult, due to low transmissivity. He also expressed that there is a need for a policy regulating the utilization of groundwater, based on different aquifer types, rather than a standard blueprint. Finally, Dr Dharmasena suggested that a better solution would be building more surface reservoirs, instead of focusing on replenishing and storing groundwater.

Mitigating Risks of Flooding

Brigadier Indunil de Silva noted that the floods experienced during the past few years on either side of the Kelani river affected over 1,000 people, creating resettlement costs for the government, and impacting drinking water in the area. Dr Dharmasena reiterated the need to identify rivers in danger of flooding, and construct reservoirs to store water at the centre of the river basis, after going through systematic procedures such as feasibility studies. Dr Gaasbeek noted that Sri Lanka's indigenous cascade system is a very good system, to the extent that he introduced something similar in Sudan. He also pointed out floods in lower regions and issues related to salinity could be related to a rise in sea levels resulting in changes in downstream areas, which needs to be further examined. Lastly, he suggested that Sri Lanka should look at how Indonesia has legislated water, as another island nation with some interesting initiatives on river basin management.

Water and Disparities

Ms Dilrukshi Handunnetti noted that, similar to certain areas in India, climate-induced migration is increasingly taking place in the North and North Central regions, with farmers migrating due to issues concerning the arable

3 http://ibfi.iwmi.org/

4 Amarnath, Giriraj; Kalanithy, Vairavamoorthy; Agarwal, A. 2017. Satellite imagery+crop insurance=farmers gain. Geospatial World, 7(3):58-61.

quality of land and the unpredictability of rainfall making it difficult to depend on agriculture as a livelihood. She then raised a question as to what kind of innovative solutions could be offered beyond a policy level, to those actually affected. Dr Amarnath responded on the unpredictability of rainfall stating that he is aware of new radar systems that will be established in Sri Lanka that will provide better climate information services and advice to farmers. He elaborated on an initiative by the South Asian Climate Outlook Forum and its partners to provide common advisory information to farmers; he stressed on the importance of such information boiling down to seasonal data, and at the village level. He also drew from experiences in South India, whereby 6,000 automatic weather stations were built, with systems providing hydro-meteorological information at their equivalent of the GN level, thus allowing farmers to make evidence-based decisions based on climate bundled information. This will constitute a big shift for farmers, and will hopefully reverse situations such as climate-induced migration.

Ms Handunnetti also stated that while Sri Lanka has been commended on its provision of water and sanitation, there are huge pockets of deprivation among the displaced. Furthermore, access to sanitation in schools is a critical issue, affecting education and gender parities. She concluded that such groups do not receive sufficient traction and should be factored into policies. Dr Balasubramanya responded by highlighting the disconnect between the solution (engineering) and management (understanding behavioural changes), which should be brought together for the solution to be effective. This is especially common in the sanitation sector, with more focus on how many toilets are built rather than the softer issues, such as lighting, access to water, etc. – in India, this has resulted in toilets being constructed, but low usage due to poor design. This requires better coordination and partnerships involving people from different areas of expertise.

Pricing Water

Mr. Charitha Ratwatte raised that while drinking water has been priced, water for agriculture still is not, and inquired if this would be possible. Dr Balasubramanya stated that pricing agricultural water is contentious, given issues of equity. A challenge in pricing irrigation water is that farmers in Sri Lanka are smallholders, producing for self-consumption as well as for sale. Economic theory states that the price of agricultural water should be the value of its marginal product, or the opportunity cost of the water, which is practically difficult to calculate. Most irrigation pricing is based on cost recovery or partial cost recovery – i.e., the cost of getting the water to the farmer, often reflecting the price of electricity (pumping) and cost of maintaining canals. Nevertheless, she agreed that in order to maintain systems of irrigation, attempts to reconcile prices of water use in agriculture must continue. She also highlighted that pricing cannot be talked about without also improving irrigation service delivery concurrently.

Dr Allan also responded by stating that many countries have tried to price water, such as Australia, although this has been expensive and not effective thus far. He argued that wherever irrigation takes place, blue/freshwater resources have been overallocated and run out. Pricing blue/freshwater is possible in industrial and domestic uses, but it is nowhere near as easy in agriculture. Capping water use in agriculture is necessary, but is always very politically difficult. Dr Balasubramanya agreed that pricing is not a panacea for all issues – she noted that globally, the demand for water is inelastic, such that the quantity of water demanded will fall disproportionately smaller to the rise in price. She agreed that thinking beyond pricing and focusing on regulation, caps and flexibly managing water use between different sectors would be prudent.

Dr Balasubramanya also posited that there has been some success in increasing the cost of irrigation in places where departments are not run by the government, given that the delivery of irrigation water to farmers is not politicised. Nevertheless, she cautioned against the assumption that this could be replicated in different contexts and emphasized that this is just an observation.

Water and the Private Sector

Given the number of industries in Sri Lanka that are water-dependent, such as the plantation and tourism sectors, Ms Shiranee Yasaratne indicated that the private sector is becoming more aware of water and climate risks, also due to exposure to the SDGs and global sustainability agendas. She questioned if the state is making use of the opportunity to direct the private sector to work further on these issues. Dr Balasubramanya agreed that there are efficiency gains where governments and private sectors discuss ideas with each other, but also raised that the

ultimate functions of the two sectors are different; some ideas and solutions could work for the private sector, and not the government, but she stressed that it is the conversations themselves that are necessary, as this is where innovations can take place.

Dr Balasubramanya also noted that if private firms are making products/services that use a significant amount of water or pollutes it, this should be incorporated into the price of the product and passed on to consumers. In the case of water as a public good, the question of who pays becomes more complicated; however, she argued that where easily executed and final clients are agreeable, governments should certainly incorporate it.

Institutional Structures and Policies for Water

Ms Tharuka Dissanaike pointed out that tools and concepts such as virtual water, the 'polluter pays' principle, etc., are not applied in decision-making. She stated that Sri Lanka does not have a policy on water use, culminating in the industrial sector extracting wherever possible, resulting in farmers and households in the dry zone paying for it. She also raised that Sri Lanka is experiencing a commodification of water. Dr Balasubramanya agreed that a water policy is required, given that there are multiple agencies responsible for portfolios concerning water. She argued that a key aspect of the policy should be that it lays out short- and long-term objectives, to provide a clear blueprint for all departments. Dr Dharmasena agreed that a watershed management policy is required, along with strict regulations on practices contributing to the contamination of water, given that acts, such as the Agrarian Services Act, are ineffective.

In response to a question posed by Dr Sarkar on whether a country should transfer the management of water-related activities from the government to a separate sovereign body, Dr Allan argued that the government is critical agent to ensure water management, as it is responsible for the legal framework surrounding water – this power cannot be vested in any other stakeholder. He acknowledged that while corporates and industries dealing with water in the supply chain are part of the accounting system, as they generate profits and pay taxes, the government is ultimately responsible for the entire system.

Dr Dharmasena argued that the responsibility of water management should lie within one institution; Sri Lanka has 10 ministries with portfolios related to water and more than 20 departments dealing with water resource management. He advocated for an apex body vested with the ability to undertake high-level decisions on water uses, measures to alleviate disparities in water resources, and respond to water-related disasters.

Dr Dharmasena added that there is a need for an apolitical coordination body, operating at the national, district and DS levels, so as to enable both top-down and bottom-up flows of information. Dr Gaasbeek reinforced this argument by highlighting that water users are important stakeholders to consider – while the government should be responsible for rules for management, decision-making needs to involve all stakeholders, including farmers, the private sector and water users, who should work together on a consensus basis to identify solutions for catchment areas. He provided an example of 25 river management committees that were set up in Sudan, which worked very well together, and suggested that this exercise be replicated in Sri Lanka.

Data and Innovations for Water

Dr Sriganesh Lokunathan raised that there have been conversations around Doppler radars coming into the country and questioned if data from it would be made available. Dr Lokunathan also stated that his experience with weather data from the Meteorology department is that it is quite poor. He then asked if policymakers have considered using micro-wavelength attenuation data from mobile networks or sensors in rivers to collect data on flooding, as is done in Israel and the Netherlands.

Dr Giriraj stated that the preparations for the installation of Doppler radars in the North and South are in process, which will provide a consistent 300km spread of weather forecast information. He also said it should be possible to enable systems to communicate rainfall predictions using communication devices and mobile towers, although not much work has been done on this so far. In terms of sensor development, he mentioned work conducted in partnership with Epic Lanka on three different sensor systems working through tower signals. After installing equipment costing Rs. 4,000 in their houses, communities in catchment areas can receive warning information periodically. It is also possible to transfer such information to insurance companies, such that products can be designed to enable pay-outs in the event of flood level breaches.

Ms Shyara Bastiansz noted that Sri Lanka is about to launch artificial rain-making technology, despite conversations at the Dialogue thus far focusing primarily on the management of current resources, which appears to be the imminent issue; she questioned if the technology is therefore ill-timed. Mr Gaasbeek concurred that water availability is sufficient in the country, and that the country needs to focus on its distribution and buffering, as well as identifying crops that use too much water and adjusting accordingly. Dr Giriraj posited that the seed varieties used by farmers are often 35-40 years old and not up-to-date with current climate and crop growth models, based on which seed varieties have been developed to optimize the use of water. Bangladesh, for instance, has started growing an improved, flood-tolerant rice variety, resulting in at least 60 percent of its yield remaining intact following floods.

Dr Balasubramanya highlighted the need to look at the quality and types of data required for different uses – for instance, precise, high quality data will be required to run models that generate projections on climate change and variability. However, a device collecting data solely for the purpose of evacuation does not need to collect data of the same quality; there can be a higher margin of error, as its function is solely to prepare people for evacuation. Such nuances need to be incorporated into public policy discourse, to develop mixed strategies for data, infrastructure and systems that are sufficiently flexible, given challenges associated with climate variability.

Dr Giriraj indicated that Sri Lanka should work towards climate screening tools that consider land, water and ecosystems holistically, where projects could go through the process at different levels. For instance, if the risk level is low, quick clearance could mean faster implementation; if the project is at a higher risk level, given climate variability, more innovation would be required to proceed. He argued that this is the right time to establish a dedicated body to allow more layered, integrated processes.

This Working Paper was compiled from a live recording of the event, and notes taken by rapporteurs. The views, opinions and ideas expressed here are a summary of the opinions of the Speakers, and do not reflect those of either UNDP Sri Lanka or LSE South Asia Centre.

The key objective of the 'Colombo Development Dialogues' is the generation of practical and relevant actions for all related sectors discussed in this Working Paper. The organisers and partners for the event will utilise all available channels to disseminate the findings of this Working Paper, which will be available to download free of charge from the websites of UNDP Sri Lanka and LSE South Asia Centre.

United Nations Development Programme
202-204, Bauddhaloka Mawatha
Colombo 7, Sri Lanka

W: lk.undp.org
T: +94 (0)112 580 691
E: registry.lk@undp.org

South Asia Centre
The London School of Economics
and Political Science
Houghton Street
London WC2A 2AE
United Kingdom

W: lse.ac.uk/southasia
T: +44 (0)20 7107 5330
E: southasiacentre@lse.ac.uk