

# Lima Adaptation Knowledge Initiative

Workshop on Priority-setting for the Indian Ocean Island Countries

20–22 October 2016  
Colombo, Sri Lanka

Workshop Report

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## 1. Introduction

Climate change adaptation knowledge gaps have been repeatedly identified as a barrier to widespread and successful adaptation actions. Recognizing this challenge, the United Nations Framework Convention on Climate Change (UNFCCC), under the Nairobi work programme (NWP), and United Nations Environment Programme (UNEP) initiated the Lima Adaptation Knowledge Initiative (LAKI) to address knowledge barriers that impede the implementation and scaling up of adaptation action, through a participatory process of knowledge gap identification, categorization and prioritization, accompanied by facilitated science–policy–practice dialogues to catalyse collaboration and the implementation of response actions to close these knowledge gaps. The LAKI was endorsed by the Conference of the Parties at its twentieth session and launched by the COP 20 President as a component of a set of actions to further address adaptation to climate change under the UNFCCC<sup>1</sup>. As part of the implementation of the LAKI, five priority-setting workshops have been held since 2014. The first three were: in Quito, Ecuador, for the Andean subregion; in Abu Dhabi, United Arab Emirates, for the Gulf Cooperation Council subregion; and in Johannesburg, South Africa, for the Southern African subregion. The two most recent workshops were held in parallel, in Colombo, Sri Lanka, from 20 to 22 October 2016, and addressed both the Indian Ocean island countries subregion and the Hindu Kush Himalaya subregion.

The Indian Ocean island countries subregion workshop was the priority-setting workshop covering the six Indian Ocean island countries: Comoros, Madagascar, the Maldives, Mauritius, the Seychelles and Sri Lanka. The International Water Management Institute (IWMI), a member of the Consultative Group of International Agricultural Research (CGIAR), based in Sri Lanka, partnered with UNEP and UNFCCC to hold this workshop. This report summarizes the proceedings of the priority-setting workshop, which took place from 20 to 22 October 2016 in Colombo, Sri Lanka.

## 2. Workshop participants

The LAKI workshop invitees were originally divided into two groups: the support group (SG) and the multidisciplinary stakeholder group (MSG). The SG includes representatives from various national, regional or international organizations that provide knowledge, financing or other in-kind support for bridging knowledge gaps. The MSG group consists of experts with relevant knowledge of the knowledge gaps that impede the adaptation actions.

The two groups were joined during the workshop. The decision to join the groups was based on the limited number of participants in the workshop, and the capacity of all participants to play the roles of both MSG members and SG members. A detailed list of participants along with their designation, organizations and areas of expertise is available in Annex II.

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<sup>1</sup> The joint action pledge of UNEP and UNFCCC is available at [https://www3.unfccc.int/pls/apex/f?p=333:31:3841983047222871::NO::P31\\_ID:521](https://www3.unfccc.int/pls/apex/f?p=333:31:3841983047222871::NO::P31_ID:521).

### 3. Key results

Early discussion led to an understanding that the smaller and larger Indian Ocean island countries faced different problems related to knowledge gaps. In consideration of these differences, the agreed list of knowledge gaps was ranked in parallel by two different groups of participants: one group of participants with expertise on the larger island countries (Madagascar and Sri Lanka); and one group with expertise on the smaller island countries (Comoros, the Maldives, the Seychelles). Tables 2(a) and 2(b) show the top priority knowledge gaps for these two groups after conducting an extensive priority-setting exercise.

The larger islands were more concerned with improving agriculture resiliency to climate change and water-conserving techniques. The smaller islands, which are less dependent on agriculture, were more concerned with the integrity of their coastal areas and the impacts of climate change on energy demand. Both groups agreed that gaps in knowledge were substantial and existing information was insufficient, inaccurate, or outdated. Significant effort and investment will be required for research, monitoring and information systems to supply the information needed for good decision-making regarding climate change resilience.

Despite issues with existing information, both groups of islands agreed, as an initial step, to compile and disseminate the scattered information that already exists into policy briefs, best practice reports and guides for local governments and farmers. In some cases, it is necessary to repackage existing information to make it more accessible to non-technical readers and people who are not necessarily literate individuals. The process of aggregating and disseminating existing data will further clarify and illustrate where, and to what extent, the existing data are insufficient, inaccurate or outdated. These gaps will be used to focus calls for new research and data production.

Table 2a. Priority knowledge gaps for the larger islands

Gap	Theme	Gap description	Target audience	Possible deliverables	
1	Agriculture /fisheries	Insufficient information on water-conserving irrigation practices and other water management techniques	<ul style="list-style-type: none"> <li>• Agricultural planners</li> <li>• Extension officials</li> <li>• Small-scale farmers (gender)</li> <li>• Water/irrigation management practitioners</li> </ul>	<ul style="list-style-type: none"> <li>• In order to address this problem of accessibility, <b>context-specific reports/best practice documents</b> for officers/technicians for both land and water need to be created and disseminated. This will ensure that knowledge at the top will reach local authorities</li> <li>• <b>Capacity-building workshops</b> that use easy-to-understand text and images will go a long way to formalize the relationship between the top and bottom levels for users</li> <li>• <u>Possible Partner:</u> IWMI</li> </ul>	<ul style="list-style-type: none"> <li>• IWMI (Repackaging existing information, producing policy briefs, setting up capacity-building workshops with stakeholders, training officials)</li> </ul>
2	Agriculture /fisheries	Insufficient information on crop and agricultural diversification	<ul style="list-style-type: none"> <li>• Farmers</li> <li>• Extension [people][officials?]</li> <li>• Planners</li> </ul>	<ul style="list-style-type: none"> <li>• For technical people, the ministries of agriculture and fisheries need to <b>compile a report or website</b> to centralize this information</li> <li>• They should <b>produce a guide</b> of diversification options for particular climate zones</li> <li>• For farmers, there needs to be an <b>oral/visual description in local languages</b> to help reach those who are illiterate.</li> <li>• A seasonal notification by telephone could be developed using mobile technology to alert farmers, with no reading necessary</li> <li>• <u>Possible partners:</u> FAO, JICA, KOICA, IFD, CGIAR</li> </ul>	<ul style="list-style-type: none"> <li>• IWMI (Repackaging existing information, producing policy briefs, helping to set up online information and notification systems, training officials)</li> </ul>
3	Agriculture /fisheries	Insufficient information on climate-smart crop varieties	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials)</li> <li>• Farmers and agro-based industries</li> <li>• NGOs</li> </ul>	<ul style="list-style-type: none"> <li>• For technical people, the ministries of agriculture and fisheries need to <b>compile a report or website</b> to centralize this information as well as engage with indigenous knowledge</li> <li>• They should <b>produce a guide</b> to diversification options for particular climate zones</li> <li>• For farmers, there needs to be an easily understandable <b>oral/visual description in local languages</b> to help reach those who are illiterate.</li> </ul>	

				<ul style="list-style-type: none"> <li>• A seasonal notification by telephone could be developed using mobile technology to alert farmers, with no reading necessary</li> <li>• <u>Possible partners:</u> FAO, JICA, KOICA, IFD, CGIAR</li> </ul>	
4	Water	Insufficient information on climatic parameters at the sub-basin/ catchment/ subnational level	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials)</li> </ul>	<ul style="list-style-type: none"> <li>• Since this information exists in bits and pieces around the region, there is a need to <b>compile an easily accessible online database</b></li> <li>• In order to avoid a pay-wall, free and/or cheaply available data could be obtained by <b>crowdsourcing data collection</b> through workshop training to empower local citizens to monitor how much rainwater they collect</li> <li>• <u>Potential partners:</u> Local universities with engaged students, IWMI mobile weather stations, local communities for crowdsourcing</li> </ul>	<ul style="list-style-type: none"> <li>• IWMI (Repackaging existing information, setting up inexpensive mobile weather stations, employing remote sensing information, building up information systems for data transparency and dissemination, producing policy briefs, training officials)</li> </ul>
5	Water	Insufficient information on water storage capacity and status (e.g. reservoirs, tanks)	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials)</li> <li>• NGOs</li> </ul>	<ul style="list-style-type: none"> <li>• Since this information exists in bits and pieces around the region, there is a need to <b>compile an easily accessible online database</b></li> <li>• In order to avoid a pay-wall, free and/or cheaply available data could be obtained by <b>crowdsourcing data collection</b> through workshop training to empower local citizens to monitor how much rainwater they collect</li> <li>• Eventually at access level, there is a need to compile information on current water storage, and this will need <b>live updates</b></li> <li>• <u>Potential partners:</u> Local universities with engaged students, IWMI has mobile weather stations and can help to train local communities for crowdsourcing</li> </ul>	<ul style="list-style-type: none"> <li>• IWMI (Compiling existing information, linking to remotely sensed and crowdsourced data, advising on additional monitoring requirements, producing an online information system, producing policy briefs, training officials)</li> </ul>
6	Agriculture /fisheries	Insufficient information on cropping calendars that precisely integrate the impacts of climate change	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials)</li> <li>• Farmers and agro-based industries</li> <li>• NGOs</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Compilation</b> of the information that already exists</li> <li>• <b>Engage with partners</b> to consolidate information</li> <li>• <b>Produce visuals and/or materials</b> in local languages</li> <li>• <u>Potential partners:</u> FAO has information on cropping calendars, local and national research institutions</li> </ul>	

Table 2b. Priority knowledge gaps for the smaller islands

Gap	Theme	Gap description	Target audience	Possible deliverables	Expressions of interest
1	Coastal areas	Insufficient information on the impacts of storm surges and other extreme events on coastal areas, including erosion and impacts on infrastructure, and drinking water supply	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials) from various ministries/ departments</li> <li>• Tourism industry</li> <li>• NGOs</li> <li>• Coastal communities</li> </ul>	<ul style="list-style-type: none"> <li>• Compile available research on erosion in the Seychelles/the Maldives/Comoros and other small island countries, organize training and develop policy briefs for ministries and policymakers</li> <li>• Based on the research, develop <b>guides</b> for local governments on how to prepare for extreme events and how to make the infrastructure more resilient to climate change (some of this information is already available at the international level and can be repackaged, including in local languages)</li> <li>• <b>Additional research</b> and data collection on erosion so as to better understand the rate of erosion on coastal areas would need to be produced taking into account the local circumstances</li> <li>• <u>Possible partners:</u> Indian Ocean Commission for the Protection of Coastal Islands</li> </ul>	
2	Agriculture/ fisheries	Insufficient knowledge on how climate change affects coastal/marine fish migration	<ul style="list-style-type: none"> <li>• Fisheries industries</li> <li>• Fisheries sector officials</li> </ul>	<ul style="list-style-type: none"> <li>• Compiling research and information on fish migration at the international level, including Japan. The information needs to be made available in the form of <b>policy briefs</b> for ministries, especially the ministries in charge of fisheries</li> <li>• Some <b>additional research</b> would also be needed to capture the local circumstances in terms of fish migration, including on aggravating local factors (coral destruction, sea water pollution)</li> <li>• <u>Possible partner:</u> FAO</li> </ul>	

3	Coastal areas	Insufficient information on the impacts of sea level rise on coastal areas, including erosion and impacts on infrastructure, and drinking water supply	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials) from various ministries/ departments</li> <li>• Tourism industry</li> <li>• NGOs</li> <li>• Coastal communities</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Compiling</b> existing information produced at the international level on the extent of inundation related to sea level rise, the impacts on existing infrastructure (including water supply) and possible responses to sea level rise in terms of coastal protection (some research has already been done in the Netherlands and at Moratuwa University in Sri Lanka)</li> <li>• More <b>research</b> on the extent of inundation at the local level and the impacts of this would also be needed for all islands, because some very local information is needed</li> <li>• The information would then need to be <b>packaged</b> for different target audiences, including national governments, tourism sector, urban planners and insurance companies</li> <li>• <u>Possible partners:</u> UNDP</li> </ul>	<ul style="list-style-type: none"> <li>• <b>UNDP</b> (Repackaging existing information, producing policy briefs, training officials)</li> </ul>
4	Coastal areas	Insufficient information on the impacts of climate change on coral reefs, including coral bleaching	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials)</li> <li>• Environmental NGOs</li> <li>• Fishers</li> <li>• Fisheries associations</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Compiling</b> existing information produced at the international level and in some local universities (e.g. in the Maldives) on the impacts of climate change on coral reefs, on the resilience of coral reefs to heat changes and on techniques contributing to coral recovery</li> <li>• Some <b>more research</b> is needed to capture local specificities, which include local aggravating factors such as the impact of the topography and freshwater pollution in the lagoons. The information needs to be packaged differently for the national level ministries, as well as for the tourism and fisheries industries</li> <li>• <u>Possible partners:</u> Indian Ocean Commission, IUCN, WWF</li> </ul>	<ul style="list-style-type: none"> <li>• <b>UNDP</b> (Repackaging existing information, producing policy briefs, training officials)</li> </ul>

5	Water	Insufficient information on climatic parameters at the sub-basin/catchment/subnational level	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Providing access</b> to the existing information produced by the governments (e.g. in the form of a website of the meteorological department, as in the case of Mauritius, or through the dissemination of this information by the government to the communities)</li> <li>• It is also necessary to develop <b>more coverage in terms of gauging stations</b> to collect information on rainfall, heat and wind patterns at the subnational level and for all small islands</li> <li>• <u>Possible partners:</u> IWMI, African Development Bank and Asian Development Bank</li> </ul>	<ul style="list-style-type: none"> <li>• IWMI (Repackaging existing information, setting up inexpensive mobile weather stations, employing remote sensing information, building up information systems for data transparency and dissemination, producing policy briefs, training officials)</li> </ul>
6	Energy	Insufficient information on the impacts of climate change on energy demand	<ul style="list-style-type: none"> <li>• Energy suppliers</li> <li>• Policymakers/governments</li> <li>• NGOs</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Compilation</b> of existing research produced on this topic at the international level</li> <li>• <b>Additional research</b> should address the increase in energy demand both from household consumption and from the most energy-intensive economic sectors (e.g. tourism, fisheries and industries including SMEs)</li> <li>• The information should be <b>packaged</b> for different target audiences, which include the ministries of energy, the national energy commissions and private-sector companies in the case of decentralized energy production</li> <li>• <u>Possible partners:</u> World Bank, Asian Development Bank, Climate investment fund (the Maldives)</li> </ul>	

*Abbreviations:* FAO = Food and Agriculture Organization, ICUN = International Union for Conservation of Nature, IWMI = International Water Management Institute, NGOs = non-governmental organizations, SMEs = small and medium-sized enterprises, UNDP = United Nations Development Programme

## 4. Methodology, process and results

### 4.1 Overall methodology

#### 4.1.1. Scoping paper

The starting point for the LAKE process was a scoping exercise to identify and synthesize adaptation knowledge gaps for the subregion. Knowledge gaps in the context of LAKE are: knowledge loopholes, shortcomings, insufficiencies and issues with inaccessible information.

Therefore, the scoping paper identified the major knowledge gaps that impede planning or implementation of adaptation activities, which are common to the majority of the countries in the region. It included both major knowledge gaps for the six Indian Ocean island countries and possible sources of support for bridging those knowledge gaps.

#### 4.1.2. Priority-setting workshop

The scoping paper was used to stimulate discussion at the priority-setting workshop. The workshop included both the MSG and SG groups and was conducted by a facilitator with the help of representatives from UNFCCC/NWP, UNEP and IWMI. The purpose was to agree on and prioritize a list of knowledge gaps, identified in the scoping paper and refined during the workshop. The workshop was structured as follows:

- On day 1: The workshop participants discussed the knowledge gaps identified in the scoping paper, and added or deleted and shared information on new knowledge gaps. The refined knowledge gaps were then categorized into: (A) no data; (B) insufficient data; (C) existing knowledge but it needs to be repackaged; and (D) existing knowledge but lack of access.
- On day 2: The participants, through a quantitative process, prioritized the knowledge gaps using two rounds of Delphi analysis.
- On day 3: The MSG and SG identified potential response actions and players for closing the priority knowledge gaps.

### 4.2 Discussion and refinement of adaptation knowledge gaps

#### 4.2.1. Major sectors and knowledge gaps

The scoping paper focused on knowledge gaps across six major sectors or areas of vulnerability to climate change: water resources; agriculture (crops, fisheries and livestock production); coastal zone and marine ecosystems; health; energy; and infrastructure and human settlement. The major knowledge gaps clusters identified in the scoping paper were:

- Inadequate information on climatic parameters, their variability and the impacts of climate change at river basins/sub-basin level;
- Inadequate information on the spatial/temporal variability of surface water and groundwater;
- Insufficient information on future water insecurity hotspots (cyclones, floods, droughts), affected areas and vulnerable populations at the subnational level;
- Inadequate information on climate change resilient crop management techniques;
- Inadequate information on climate change resilient water management techniques;
- Insufficient information on water productivity improvements;
- Insufficient information on reducing post-harvest losses;
- Lack of knowledge on sustainable fisheries management and food security;
- Insufficient information on coastal area inundation/erosion and the impacts of these;
- Insufficient information on climate change impacts on coastal/marine fish habitats;
- Inadequate knowledge of direct and indirect climate change impacts on health at the regional level;
- Inadequate information on increasing demand for energy and energy efficiency;
- Inadequate information on the potential locations/method for promoting renewable energy generation and use;
- Lack of information on the real cost of electricity generation;
- Lack of information on how climate change has an impact on human settlements.

Within these major knowledge gap clusters, the scoping paper identified 31 knowledge gaps that impede adaptation actions to climate change.

#### 4.2.2. Integrating inputs from the multidisciplinary stakeholder group members

On day 1 of the workshop, MSG members were split into two thematic working groups, which largely overlapped the larger island countries and smaller island countries group, to revise the scoping paper. Most of the participants from Sri Lanka and Madagascar worked on water and agriculture gaps while most participants from the Seychelles, the Maldives and Comoros refined the coastal areas, energy, infrastructure, human settlements and health gaps.

Each island nation had varying richness and availability of data, and the MSG members assigned a letter to each gap depending on the situation within the country:

- A. No data;
- B. Insufficient data;
- C. Existing knowledge but it needs to be repackage;
- D. Existing knowledge but lack of access.

Discussions revealed that, in most countries, some data exist but the data need to be supplemented with further data collection. For example, in Madagascar, some government departments provide information only until 2009, meaning that the information for the six most recent years is missing. Therefore, in keeping with the general approach to knowledge gaps under LAKEI, and taking into account subregional specificities, the gaps falling under the categories B, C and D were considered for the prioritization exercise.

### 4.2.3. Defining categories of gaps at the sub regional level

The MSG members discussed the scoping paper knowledge gaps in detail and agreed upon a total of 38 gaps (table 3) across the 6 themes:

- Water resources – 5 knowledge gaps;
- Agriculture (crops, fisheries and livestock production) – 16 knowledge gaps;
- Coastal zones and marine ecosystems – 6 knowledge gaps;
- Health – 2 knowledge gaps;
- Energy – 3 knowledge gaps;
- Infrastructure and human settlement – 4 knowledge gaps;
- Cross-cutting – 2 knowledge gaps.

**Table 3. Knowledge gaps selected for prioritization**

No.	Sector	Knowledge gap
1	Water	Insufficient information on climatic parameters at the sub-basin/catchment/subnational level
2	Water	Insufficient information on the interaction between surface water and groundwater (including effects on water level and water quality) at sub-basin/catchment/subnational level
3	Water	Insufficient information on water storage capacity and status (e.g. reservoirs, tanks)
4	Water	Insufficient knowledge on water withdrawals, depletion (evapotranspiration, quality deterioration), return flows and reuse
5	Water	Insufficient information on areas potentially affected by the water salinity induced by climate change
6	Agriculture/fisheries	Insufficient information on cropping calendars that precisely integrate the impacts of climate change
7	Agriculture/fisheries	Insufficient information on climate-smart crop varieties
8	Agriculture/fisheries	Insufficient information on emerging pest/weed issues due to climate change, and related management techniques
9	Agriculture/fisheries	Insufficient information on local/traditional knowledge on agricultural adaptation practices (including women’s knowledge)
10	Agriculture/fisheries	Insufficient knowledge on the effects of climate change on land use, including forestry
11	Agriculture/fisheries	Insufficient information to develop and facilitate uptake of crop insurance products related to climate change impacts
12	Agriculture/fisheries	Insufficient information on water-conserving irrigation practices and other water management techniques
13	Agriculture/fisheries	Insufficient information on increasing physical water productivity (kg of crop/m <sup>3</sup> of water or “crop per drop” approach)
14	Agriculture/fisheries	Insufficient information on crop and agricultural diversification
15	Agriculture/fisheries	Insufficient information on climate change impacts on fisheries/aquaculture and possible adaptation response actions
16	Agriculture/fisheries	Insufficient information on the impacts of climate change on livestock, and possible adaptation response measures (e.g. breed, feed)
17	Agriculture/fisheries	For policymakers, insufficient information on appropriate post-harvest techniques for key food and cash crops
18	Agriculture/fisheries	For farmers and farmer associations, insufficient information on appropriate post-harvest techniques for key food and cash crops

19	Agriculture/fisheries	Insufficient information on climate change impacts on crop prices and markets
20	Agriculture/fisheries	Insufficient information on the impacts of both extreme events and slow-onset events (e.g. sea level rise) on coastal irrigated agriculture, aquaculture and fisheries
21	Agriculture/fisheries	Insufficient knowledge on how climate change affects coastal/marine fish migration
22	Coastal areas	Insufficient information on the impacts of storm surges and other extreme events on coastal areas, including erosion and impacts on infrastructure, and drinking water supply
23	Coastal areas	Insufficient information on the impacts of sea level rise on coastal areas, including erosion and impacts on infrastructure, and drinking water supply
24	Coastal areas	Insufficient information on the impacts of climate change on coral reefs, including coral bleaching
25	Coastal areas	Insufficient information on coastal protection infrastructures
26	Coastal areas	Insufficient information to develop early warning systems that integrate climate change induced extreme events (droughts)
27	Coastal areas	Insufficient information on ecosystem-based adaptation (EbA) measures to reduce the impacts of climate change on coastal areas
28	Health	Insufficient evidence on direct health hazards due to climate change impacts (heat stress/strokes, cardiovascular and respiratory disorders)
29	Health	Insufficient knowledge on indirect impacts of climate change on health (water/vector/rodent-borne diseases, food insecurity, malnutrition) including in relation to the deteriorated of socioeconomic conditions induced by climate change
30	Energy	Insufficient information on the impacts of climate change on energy demand
31	Energy	Insufficient information on measures to respond to changes in energy demand
32	Energy	Insufficient information on the impacts of climate change on hydropower generation
33	Human settlements	Insufficient information on hazards and vulnerability to hazards (e.g. landslides, floods) in human settlements
34	Human settlements	Lack of information to develop and facilitate the uptake of infrastructure insurance products related to climate change impacts
35	Human settlements	Insufficient information on green/climate-resilient infrastructure
36	Human settlements	Insufficient information on climate-resilient wastewater infrastructure and waste management techniques
37	Cross-cutting	Insufficient information on available sources of funding, especially for local governments, NGOs and SMEs
38	Cross-cutting	Insufficient knowledge on medium- and long-term impacts of completed adaptation projects

Abbreviations: NGOs = non – governmental organizations, SMEs = small and medium sized enterprises.

## 4.3 Prioritization of gaps

### 4.3.1. Defining and ranking the scoring criteria

On day 2, the participants prioritized the gaps using a multi-criteria ranking procedure called a Delphi analysis. Participants defined four criteria by which to judge the importance of a gap, and they individually scored each gap based on how important they believed it to be. Table 4 lists those criteria and their average weight, calculated by dividing the criteria score by the sum of all the scores.

**Table 4. Criteria, effect and weights for the Delphi analysis**

Urgency	Closing the gap would generate benefits in the short term or address urgent adaptation needs or reduce high potential threats (early warning systems)	31
Efficacy for influencing policymaking and management processes	Filling the gap supports policymaking and management processes at the national, local, and sectorial levels	29
Positive effects on populations, goods, and public services with minimal trade-offs	Closing the gap would generate positive effects on socioeconomic development as well as their amenities with minimal trade-offs	21
Potential to support climate resilience across sectors and systems	Filling the knowledge gap would help increase climate resilience across sectors and systems	19

#### 4.3.2. Scoring the knowledge gaps against the criteria

For the first round of Delphi analysis, delegates filled out score sheets and rated how important each adaptation knowledge gap was according to the criterion on a scale from 1 (not that important) to 5 (extremely important). The priority scores for each gap were determined by factoring in the weightings based on the ranking of the criteria.

In discussing the outcome of the first round of Delphi analysis, it became evident that the prioritization did not accurately reflect the needs of some of the countries. For example, representatives from small islands prioritized coastal areas problems (e.g. slow-onset events, the bleaching of corals), but in the analysis the priorities of larger islands took prominence. This is because representation at the meeting was skewed to the large islands: there were four representatives from Sri Lanka and three from Madagascar, whereas the Maldives, Comoros and the Seychelles had only one representative each.

Therefore, a decision was made to recalculate the results of the first round of Delphi analysis separately for the larger island countries, and the smaller island countries. Below are two line graphs (figure 1) that show the gap ranks and their respective average scores. By examining them to find where the logical break point was between important and unimportant gaps, the groups refined their prioritizations. The larger islands coalition would move forward to the second round of Delphi with 23 priority gaps (average score of 3.3 and above) (see table 5a) while the small islands would consider 25 priority gaps (average score of 3.6 and above) (table 5b).

Figure 1. Weighted scores of the first round of Delphi analysis for the 38 gaps

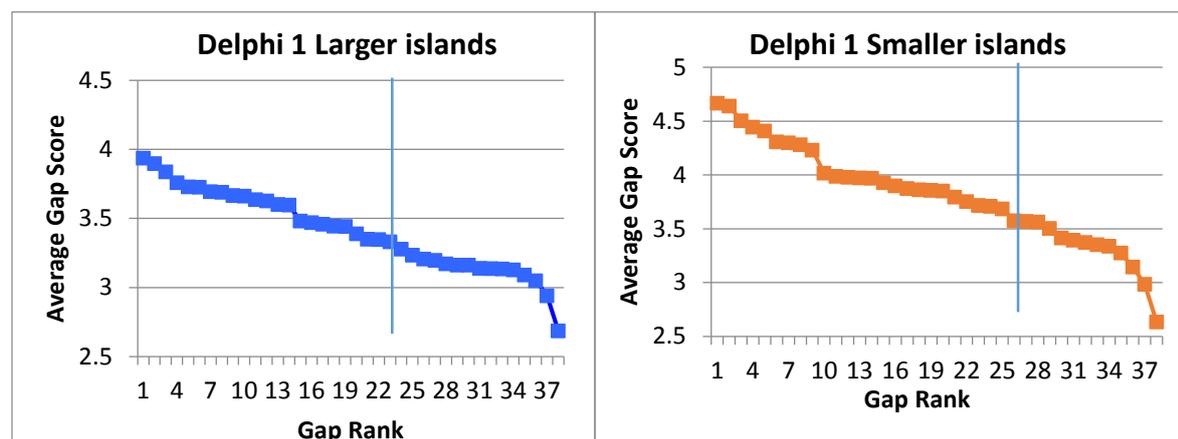


Table 5a. Complete list of knowledge gaps for larger islands after the second round of Delphi analysis

1	Agriculture /fisheries	Insufficient information on water-conserving irrigation practices and other water management techniques	<ul style="list-style-type: none"> <li>• Agricultural planners</li> <li>• Extension officials</li> <li>• Small-scale farmers (gender)</li> <li>• Water/irrigation management practitioners</li> </ul>
2	Agriculture /fisheries	Insufficient information on crop and agricultural diversification	<ul style="list-style-type: none"> <li>• Farmers</li> <li>• Extension officials</li> <li>• Planners</li> </ul>
3	Agriculture /fisheries	Insufficient information on climate-smart crop varieties	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials)</li> <li>• Farmers and agro-based industries</li> <li>• NGOs</li> </ul>
4	Water	Insufficient information on climatic parameters at the sub-basin/catchment/subnational level	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials)</li> </ul>
5	Water	Insufficient information on water storage capacity and status (e.g. reservoirs, tanks)	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials)</li> <li>• NGOs</li> </ul>
6	Agriculture /fisheries	Insufficient information on cropping calendars that precisely integrate the impacts of climate change	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials)</li> <li>• Farmers and agro-based industries</li> <li>• NGOs</li> </ul>
7	Health	Insufficient knowledge of indirect impacts of climate change on health (water/vector/rodent-borne diseases, food insecurity, malnutrition) including in relation to the deteriorated socioeconomic conditions induced by climate change	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials) from various ministries/departments</li> <li>• Health professionals (public, private sector and NGOs)</li> <li>• Local communities</li> </ul>
8	Agriculture /fisheries	Insufficient information on the impacts of climate change on livestock, and possible adaptation response measures (e.g. breed, feed)	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• Cattle herders, farmers and agro-based industries</li> </ul>
9	Agriculture /fisheries	Insufficient information on increasing physical water productivity (kg of crop/m <sup>3</sup> of water or “crop per drop” approach)	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> </ul>

			<ul style="list-style-type: none"> <li>• NGOs</li> <li>• Farmers and agro-based industries</li> </ul>
<b>10</b>	Coastal areas	Insufficient information on the impacts of storm surges and other extreme events on coastal areas, including erosion and impacts on infrastructure, and drinking water supply	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials) from various ministries/departments</li> <li>• Tourism industry</li> <li>• NGOs</li> <li>• Coastal communities</li> </ul>
<b>11</b>	Water	Insufficient information on the interaction between surface water and groundwater (including effects on water level and water quality) at sub-basin/catchment/subnational level	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials) need to have better access to the existing information</li> </ul>
<b>12</b>	Energy	Insufficient information on the impacts of climate change on energy demand	<ul style="list-style-type: none"> <li>• Energy suppliers</li> <li>• Policymakers/governments</li> <li>• NGOs</li> </ul>
<b>13</b>	Water	Insufficient knowledge on water withdrawals, depletion (evapotranspiration, quality deterioration), return flows and reuse	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials) need to have better access to the existing information.</li> <li>• NGOs</li> <li>• Farmer associations</li> <li>• Farmers</li> </ul>
<b>14</b>	Human settlements	Insufficient information on hazards and vulnerability to hazards (e.g. landslides, floods) in human settlements	<ul style="list-style-type: none"> <li>• Local-level/national-level policymakers/governments</li> <li>• NGOs</li> <li>• Communities</li> </ul>
<b>15</b>	Agriculture /fisheries	For farmers and farmer associations, insufficient information on appropriate post-harvest techniques for key food and cash crops	<ul style="list-style-type: none"> <li>• Farmers and agro-based industries</li> </ul>
<b>16</b>	Energy	Insufficient information on measures to respond to changes in energy demand	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• NGOs</li> <li>• Power utilities/energy suppliers</li> </ul>
<b>17</b>	Agriculture /fisheries	Insufficient information on climate change impacts on fisheries/aquaculture and possible adaptation response actions	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• Fishers and fishery industries</li> </ul>
<b>18</b>	Coastal areas	Insufficient information to develop early warning systems that integrate climate change induced extreme events (droughts)	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• NGOs</li> </ul>
<b>19</b>	Cross-cutting	Insufficient information on available sources of funding, especially for local governments, NGOs and SMEs	<ul style="list-style-type: none"> <li>• Local governments</li> <li>• SMEs</li> <li>• NGOs</li> </ul>
<b>20</b>	Agriculture /fisheries	Insufficient knowledge on the effects of climate change on land use, including forestry	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> </ul>
<b>21</b>	Health	Insufficient evidence on direct health hazards due to climate change impacts (heat stress/strokes, cardiovascular and respiratory disorders)	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials) from various ministries/departments</li> <li>• Health professionals (public, private sector and NGOs)</li> <li>• Local communities</li> </ul>

22	Cross-cutting	Insufficient knowledge on medium- and long-term impacts of completed adaptation projects	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• NGOs,</li> <li>• Local communities</li> </ul>
23	Agriculture /fisheries	Insufficient information on the impacts of both extreme events and slow-onset events (e.g. sea level rise) on coastal irrigated agriculture, aquaculture, and fisheries	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• Farmers, farmer associations, NGOs and agro-based industries</li> <li>• Fishers and fishing industry</li> </ul>

Abbreviations: NGOs = non-governmental organizations, SMEs = small and medium sized enterprises

**Table 5b. Complete list of knowledge gaps for smaller islands after the second round of Delphi analysis**

Rank	Theme	Gap description	Target audience
1	Coastal areas	Insufficient information on the impacts of storm surges and other extreme events on coastal areas, including erosion and impacts on infrastructure, and drinking water supply	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials) from various ministries/departments</li> <li>• Tourism industry</li> <li>• NGOs</li> <li>• Coastal communities</li> </ul>
2	Agriculture /fisheries	Insufficient knowledge on how climate change affects coastal/marine fish migration	<ul style="list-style-type: none"> <li>• Fisheries industries</li> <li>• Fisheries sector officials</li> </ul>
3	Coastal areas	Insufficient information on the impacts of sea level rise on coastal areas, including erosion and impacts on infrastructure, and drinking water supply	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials) from various ministries/departments</li> <li>• Tourism industry</li> <li>• NGOs</li> <li>• Coastal communities</li> </ul>
4	Coastal areas	Insufficient information on the impacts of climate change on coral reefs, including coral bleaching	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials)</li> <li>• Environmental NGOs</li> <li>• Fishers</li> <li>• Fisheries associations</li> </ul>
5	Water	Insufficient information on climatic parameters at the sub-basin/ catchment/subnational level	<ul style="list-style-type: none"> <li>• Policymakers (local planners, government officials)</li> </ul>
6	Energy	Insufficient information on the impacts of climate change on energy demand	<ul style="list-style-type: none"> <li>• Energy suppliers</li> <li>• Policymakers/governments</li> <li>• NGOs</li> </ul>
7	Human settlements	Insufficient information on climate-resilient wastewater infrastructure and waste management techniques	<ul style="list-style-type: none"> <li>• Governments/policymakers</li> <li>• NGOs</li> <li>• Private sector</li> </ul>
8	Energy	Insufficient information on measures to respond to changes in energy demand	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• NGOs</li> <li>• Power utilities/energy suppliers</li> </ul>
9	Agriculture /fisheries	For policymakers, insufficient information on appropriate post-harvest techniques for key food and cash crops	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> </ul>
10	Agriculture /fisheries	Insufficient information on climate change impacts on crop prices and markets	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• Farmers associations, NGOs, farmers and agro-based industries</li> </ul>

<b>11</b>	Agriculture /fisheries	For farmers and farmer associations, insufficient information on appropriate post-harvest techniques for key food and cash crops	<ul style="list-style-type: none"> <li>• Farmers and agro-based industries</li> </ul>
<b>12</b>	Water	Insufficient information on the interaction between surface water and groundwater (including effects on water level and water quality) at sub-basin/ catchment/subnational level	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> </ul>
<b>13</b>	Agriculture /fisheries	Insufficient information on crop and agricultural diversification	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• Farmers and agro-based industries</li> </ul>
<b>14</b>	Agriculture /fisheries	Insufficient information on climate-smart crop varieties	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• NGOs</li> <li>• Farmers and agro-based industries</li> </ul>
<b>15</b>	Agriculture /fisheries	Insufficient information on emerging pest/weed issues due to climate change, and related management techniques	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• NGOs</li> <li>• Farmers and agro-based industries</li> </ul>
<b>16</b>	Health	Insufficient evidence on direct health hazards due to climate change impacts (heat stress/strokes, cardiovascular and respiratory disorders)	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials) from various ministries/departments</li> <li>• Health professionals (public, private sector and NGOs)</li> <li>• Local communities</li> </ul>
<b>17</b>	Water	Insufficient information on water storage capacity and status (e.g. reservoirs, tanks)	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials) need to have better access to the existing information</li> <li>• NGOs</li> </ul>
<b>18</b>	Human settlements	Insufficient information on hazards and vulnerability to hazards (e.g. landslides, floods) in human settlements	<ul style="list-style-type: none"> <li>• Local-level/national-level policymakers/ governments</li> <li>• NGOs</li> <li>• Communities</li> </ul>
<b>19</b>	Coastal areas	Insufficient information to develop early warning systems that integrate climate change induced extreme events (droughts)	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• NGOs</li> </ul>
<b>20</b>	Agriculture /fisheries	Insufficient knowledge on the effects of climate change on land use, including forestry	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> </ul>
<b>21</b>	Agriculture /fisheries	Insufficient information on the impacts of both extreme events and slow-onset events (e.g. sea level rise) on coastal irrigated agriculture, aquaculture and fisheries	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• Farmers, farmer associations, NGOs, and agro-based industries</li> <li>• Fishers and fishing industry</li> </ul>
<b>22</b>	Water	Insufficient knowledge on water withdrawals, depletion (evapotranspiration, quality deterioration), return flows and reuse	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials) need to have better access to the existing information</li> <li>• NGOs</li> <li>• Farmer associations</li> <li>• Farmers</li> </ul>
<b>23</b>	Coastal areas	Insufficient information on EbA measures to reduce the impacts of climate change on coastal areas	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• Environmental NGOs, other NGOs</li> <li>• Local communities</li> </ul>

24	Agriculture /fisheries	Insufficient information on increasing physical water productivity (kg of crop/m <sup>3</sup> of water or “crop per drop” approach)	<ul style="list-style-type: none"> <li>• Policymakers (planners, (local) government officials)</li> <li>• NGOs</li> <li>• Farmers and agro-based industries</li> </ul>
25	Energy	Insufficient information on the impacts of climate change on hydropower generation	<ul style="list-style-type: none"> <li>• Policymakers</li> <li>• NGOs</li> <li>• Energy suppliers/electricity utilities</li> </ul>

Abbreviations: non-governmental organizations, SMEs = small and medium sized enterprises

Upon completing the second round of Delphi analysis, each group determined its final prioritizations for the adaptation knowledge gaps that were most relevant to them. The graphs below (figure 2) show the final gap ranks and the sum of their respective scores. The prioritized list of knowledge gaps after the second round of Delphi analysis for the Indian Ocean island countries is given in table 6.

Figure 2. Weighted score of the second round of Delphi analysis for the priority gaps

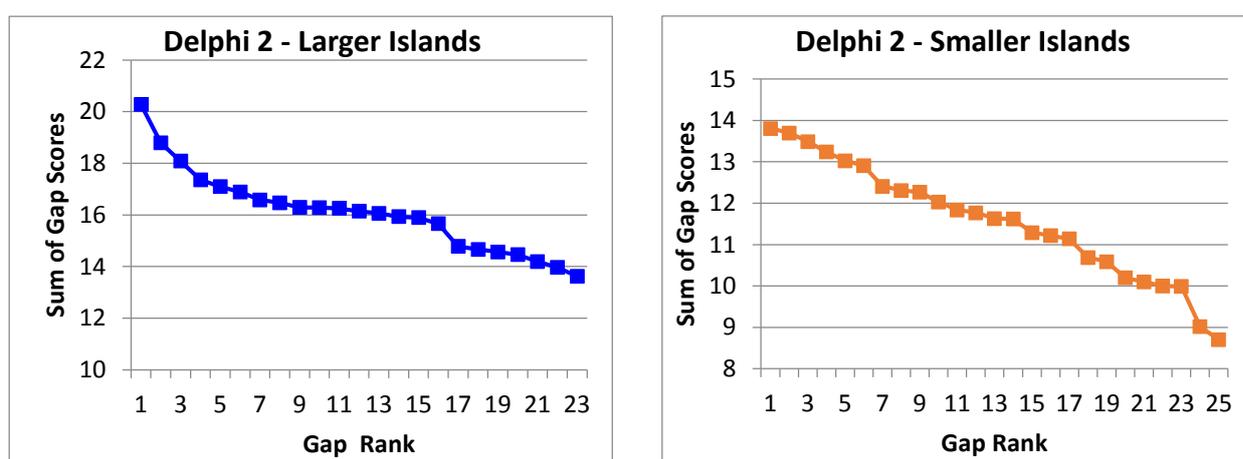


Table 6. Prioritized knowledge gaps

Priority gap	Larger islands		Smaller islands	
	Sector	Description	Sector	Description
1	Agriculture/ Fisheries	Insufficient information on water-conserving irrigation practices and other water management techniques	Coastal areas	Insufficient information on the impacts of storm surges and other extreme events on coastal areas, including erosion and impacts on infrastructure, and drinking water supply
2	Agriculture/ Fisheries	Insufficient information on crop and agricultural diversification	Agriculture/ Fisheries	Insufficient knowledge on how climate change affects coastal/marine fish migration
3	Agriculture/ Fisheries	Insufficient information on climate-smart crop varieties	Coastal areas	Insufficient information on the impacts of sea level rise on coastal areas, including erosion and impacts on infrastructure, and drinking water supply
4	Water	Insufficient information on climatic parameters at the sub-basin/catchment/ subnational level	Coastal areas	Insufficient information on the impacts of climate change on coral reefs, including coral bleaching

5	Water	Insufficient information on water storage capacity and status (e.g. reservoirs, tanks)	Water	Insufficient information on climatic parameters at the sub-basin/catchment/ subnational level
6	Agriculture/ Fisheries	Insufficient information on cropping calendars that precisely integrate the impacts of climate change	Energy	Insufficient information on the impacts of climate change on energy demand

#### 4.4 Identification of possible response actions

##### 4.4.1. Presentation of innovative approaches to closing knowledge gaps

Ms. Parimita Mohanty, the Climate Technology Center and Network (CTCN) Coordinator for Asia Pacific, presented participants with success stories of closing knowledge gaps around Asia. The CTCN aims to promote climate change adaptation information and technology transfer from a consortium to developing countries. The CTCN provides three services: technical assistance; information and knowledge; and networking and collaboration. She highlighted the CTCN's work in Indonesia, where it helped to provide hydrological models for sinking islands, and Thailand, where it helped to bring new technologies about precision farming to the farmers through a five-day workshop. The approach of the CTCN is effective and sustainable and proceeds as follows:

- Involve communities early to make sure that they are invested from the beginning;
- Complete socioeconomic and cultural assessment via surveys;
- Identify technologies and partners to engage, and set up workshops for capacity-building;
- Develop projects with stakeholders so that knowledge gained can be retained;
- Compile documentation on best practices and lessons learned to be shared and hopefully replicated elsewhere.

Participants also viewed a video presentation about Educational Partnerships for Innovation in Communities Network (EPIC-N), which highlighted the issue that, normally, cities are in need of support and technical assistance, but lack the time, staff, or budget. By connecting university classrooms to real-world projects in a coordinated effort, EPIC-N helps communities to fill that gap while providing valuable experience to the next generation of local leaders. Its goals are:

1. To actively increase the number of universities and communities implementing the EPIC Framework;
2. To support and enhance existing EPIC programmes through various forms of peer-to-peer learning and support services;
3. To provide a conduit for new knowledge on selected social and environmental issues to universities and communities;
4. To alter the national discourse about the role, structure and performance of the nation's higher education institutions in meeting some of society's most pressing social problems.

A representative from San Diego State University provided an example of the cooperation between the university and the local government in National City, California, to address their livability and sustainability goals. The audience at the workshop widely commented that this

could be a replicable model for their own nations to follow, if they could get the investment by universities and communities.

#### 4.4.2 List of expressions of interest and possible response actions for the priority gaps

Table 7 lists the institutions in the workshop that pledged support for filling the knowledge gaps, and also lists potential institutions with an interest in and capacity for filling those knowledge gaps.

**Table 7. Institutions that could help to fill knowledge gaps<sup>2</sup>**

<b>No.<sup>2</sup></b>	<b>Knowledge gaps</b>	<b>Potential institutions of support</b>
2a.1	Insufficient information on water-conserving irrigation practices and other water management techniques	IWMI
2a.2	Insufficient information on crop and agricultural diversification	FAO, JICA, IFAD, local research institutes
2a.3	Insufficient information on climate-smart crop varieties	FAO, CCAFS, IFAD
2a.4	Insufficient information on climatic parameters at the sub-basin/catchment/subnational level	IWMI, ADB, local universities
2a.5	Insufficient information on water storage capacity and status (e.g. reservoirs, tanks)	IWMI, local universities
2a.6	Insufficient information on cropping calendars that precisely integrate the impacts of climate change	FAO, local and international research organizations
2b.1	Insufficient information on the impacts of storm surges and other extreme events on coastal areas, including erosion and impacts on infrastructure, and drinking water supply	Indian Ocean Commission[ for the protection of Small Islands]
2b.2	Insufficient knowledge on how climate change affects coastal/marine fish migration	FAO
2b.3	Insufficient information on the impacts of sea level rise on coastal areas, including erosion and impacts on infrastructure, and drinking water supply	UNDP
2b.4	Insufficient information on the impacts of climate change on coral reefs, including coral bleaching	UNDP, IUCN, WWF
2b.5	Insufficient information on climatic parameters at the sub-basin/catchment/subnational level	IWMI, ADB
2b.6	Insufficient information on the impacts of climate change on energy demand	World Bank, ADB, Climate Investment Fund

*Abbreviations:* ADB = Asian Development Bank, CCAFS = Climate Change Agriculture and Food Security, CGIAR =Consultative Group for International Agriculture Research, FAO = Food and Agriculture Organisation, IFAD = International Fund for Agriculture Development, IUCN =

<sup>2</sup> Institutes participating in the workshop that indicated interest in supporting the filling of knowledge gaps are highlighted with bold print. The other institutions listed are suggestions of organizations that could potentially help.

International Union for Conservation of Nature, IWMI = International Water Management Institute, UNDP = United Nations Development Programme, WWF = World Wildlife Fund.

## 5. Identification of next steps in terms of follow-up

### 5.1. Role of the participants

Following the workshop, participants who have expressed an interest in undertaking response actions are to be invited to submit an action pledge under the NWP, implement the response actions and report on the progress as an update of their action pledge.

Participants are also encouraged to link up with organizations that have offered assistance or that have been suggested for their ability to provide assistance towards filling knowledge gaps. MSG members could work with such organizations to disseminate existing knowledge or work with them to enhance the stakeholders' knowledge in the sub region.

### 5.2. Role of the regional coordinating entity

IWMI has offered to assist in:

- Collecting, harmonizing and disseminating existing direct knowledge;
- Planning for additional monitoring;
- Building online information systems to assist in data collection, dissemination and transparency;
- Repackaging the existing knowledge in the form of awareness-raising, capacity-building, and decision-support products and tools that suit local contexts;
- Conducting research and holding workshops with the local stakeholders to enhance knowledge in each of these areas and disseminate findings widely.

### 5.3. Roles of the United Nations Environment Programme and UNFCCC/the Nairobi work programme

In partnership with IWMI, UNEP and the UNFCCC/NWP will disseminate the results of the workshop and reach out to the best-placed organizations to ensure that the most pressing adaptation knowledge needs of the sub region are widely known and effectively addressed.

As a first step, the results of the priority-setting workshop were presented to the United Nations Climate Change Conference in Marrakech by UNEP during the reporting of the progress on the LAKI process. The UNFCCC secretariat also presented the results of the workshop in various thematic events and side-events, including the global climate action event on water, and a side-event organized by the Convention on Biological Diversity and the Friends of Ecosystem-based Adaptation.

The conclusions of the Subsidiary Body for Scientific and Technological Advice on the Nairobi work programme adopted in Marrakech welcomed the LAKI, including the most recent workshops held in Hindu Kush Himalaya and Indian Ocean Island countries in collaboration with the ICIMOD and IWMI<sup>3</sup>

## 6. Concluding remarks

The LAKI workshop was very useful for understanding the knowledge gaps that are substantial barriers to implementing climate adaptation activities in the Indian Ocean island countries. It appears that although existing information is not always complete, sufficient, or fit for purpose, some of the information required to fill the prioritized knowledge gaps is available within local, regional and international organizations. What is immediately required is the initiation of a process to compile this information, repackaged if necessary, to address the LAKI knowledge gaps, and disseminate widely among the stakeholders.

The LAKI approach being regularly refined, the UNFCCC/NWP and UNEP will look into the results of the evaluation survey taken by workshop participants in order to make the next priority-setting workshops even more efficient and impactful. They would particularly take into consideration the following recommendations made by participants:

- Sufficient lead-up time for preparation and more consultation with the stakeholders before the workshop would be useful for identifying the knowledge gaps;
- More participation of the local water, agriculture and coastal zone institutions that associate closely with the climate adaptation activities and/or sectors with knowledge gaps at the workshop would have made the LAKI process more thorough. The input from the small number of participants in the prioritizing exercise may not represent the actual priorities in the countries. One way to achieve greater inclusion of institutions working on adaptation may be to complement a workshop, which had limited participation, with a follow-up survey of a much larger group of institutions;
- Only the participation of senior managers and policymakers can ensure that resources are directed to support the closing of knowledge gaps. The UNFCCC and UNEP should inform and reach agreement with the policymakers/managers to get their consent on the identified priorities of the countries.

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<sup>3</sup> See paragraph 8 of the conclusions, available at <http://unfccc.int/resource/docs/2016/sbsta/eng/122.pdf>

## ANNEX I – Agenda of Workshop

### LAKI – The Priority-Setting Workshop for Hindu Kush Himalayan subregion and Indian Ocean Islands

20–22 October 2016

Venue: Taj Samudra, Colombo, Sri Lanka

#### Thursday 20 October – Day 1: Refining and categorizing knowledge gaps

<i>Opening and setting the scene for both subregions</i>	
9:00 – 9:30 am	Opening remarks: Dr. Barney Dickson, UNEP Ms. Rojina Manandhar, UNFCCC/NWP Dr. Dhruvad Choudhury, ICIMOD Dr. Upali Amarasinghe, IWMI
9:30 – 10:00 am	Introduction of the workshop participants
10:00 – 11:00 am	Presentation of the results of the scoping paper and discussion on the knowledge gaps ( <i>plenary session</i> )
<i>Coffee break</i> 11:00 – 11:30 am	
11:30 am – 12:45 pm	Discussion of the knowledge gaps by the MSG with inputs from the support group (SG) members ( <i>thematic working groups</i> )
12:45 – 1:30 pm	Reporting of the thematic working groups' results followed by a collective discussion to produce the exhaustive list of identified gaps ( <i>plenary session</i> )
<i>Lunch break</i> 1:30 – 2:30 pm	
2:30 – 3:00 pm	Discussion and agreement on the categories of knowledge gaps ( <i>plenary session</i> )
3:00 – 4:30 pm	Categorization of the identified knowledge gaps by MSG with inputs from the SG members ( <i>thematic working groups</i> )
<i>Coffee break</i> 4:30 – 5:00 pm	
5:00 – 6:30 pm	Reporting on the results of the thematic working groups, followed by a discussion to produce the clean list of LAKI knowledge gaps ( <i>plenary session</i> ) Presentation of the expectations for Day 2
By 9:30 pm	Communication (via email) of expressions of interests in closing one or several of the identified knowledge gaps ( <i>individual exercise</i> )

## Friday 21 October – Day 2: Prioritizing knowledge gaps

9:00 – 9:30 am	Introduction to Day 2 activities Presentation of the outcomes of the expressions of interest to facilitate informal exchanges, between participants interested in collaborating to close knowledge gaps ( <i>plenary session</i> )
9:30 – 11:00 am	Identification of criteria for prioritization of the knowledge gaps ( <i>plenary session</i> ) Assignment of weights to the different criteria ( <i>individual exercise by MSG members</i> ) Presentation of the weighted criteria ( <i>plenary session</i> )
<i>Coffee break</i> 11:00 – 11:30 am	
11:30 am – 12:30 pm	First Delphi round for scoring of gaps against criteria ( <i>individual exercise by MSG members</i> )
<i>Lunch break</i> 12:30 – 1:30pm	
1:30 – 3:00 pm	Presentation and discussion of the scoring results ( <i>plenary session</i> )
3:00 – 4:00pm	Second Delphi round for scoring of the priority knowledge gaps ( <i>individual exercise by MSG members</i> )
<i>Coffee break</i> 4:00 – 4:30 pm	
4:30 – 5:30 pm	Presentation of and discussion on the prioritized list of knowledge gaps ( <i>plenary session</i> )
5:30 – 6:30 pm	Presentation of innovative long-term approaches to close adaptation knowledge gaps ( <i>common plenary for both subregions</i> ) Presentation of the expectations for Day 3
By 9:30 pm	Communication (via email) of expression of interests in closing one or several of the priority knowledge gaps, and/or other identified knowledge gaps

### Saturday 22 October – Day 3: Designing response actions

9:00 – 9:30 am	Introduction to Day 3 activities Presentation of the expressions of interest and definition of “response action” working groups for the priority knowledge gaps ( <i>plenary session</i> )
9:30 – 11:00 am	<i>In parallel:</i> <ul style="list-style-type: none"> <li>• Design of collaborative response actions to close one or several priority knowledge gaps (<i>response action working groups</i>)</li> <li>• Discussion of possible deliverables and best placed organizations to close the priority knowledge gaps that are not being discussed by the response action groups (<i>thematic working groups</i>)</li> </ul>
<i>Coffee break</i> 11:00 – 11:30 am	
11:30 am– 12:30 pm	Discussion of the response actions, including consolidation of response actions based on outcomes of the response action working group, possible deliverables and best placed organizations to close the priority knowledge gaps ( <i>thematic working groups</i> )
12:30 – 1:30pm	Reporting on the outcomes of discussions and general discussion on the results ( <i>plenary session</i> )
<i>Lunch break</i> 1:30 – 2:30 pm	
2:30 – 4:00 pm	<i>In parallel:</i> <ul style="list-style-type: none"> <li>• Design of collaborative response actions to close priority knowledge gaps and other identified knowledge gaps (<i>response action groups</i>)</li> <li>• Brainstorming session to provide feedback on the workshop and discuss possible innovative approaches to close adaptation knowledge gaps (<i>plenary for both subregions</i>)</li> </ul>
<i>Coffee break</i> 4:00 – 4:30 pm	
<b><i>Closing session for both subregions</i></b>	
4:30 – 5:30 pm	Presentation of the key results of both subregions and of the next steps Closing remarks

## ANNEX II – List of participants of LAKI Workshop

Country	Name	Designation	Organization/ government	Expertise
Comoros	Mr. Abdouchakour Mohamed Abderemane	Head of Application Research and Adjoint Operational Focal Point	GEF Comoros	Fisheries Environment
Madagascar	Mrs. Michelle Andriamahazo	Head	Environment Department within the Ministry of Agriculture and Livestock	Environment Agriculture Rural development
Madagascar	Mrs. Mino Nandrianina Rakotonandrasana	Co-Chair	Madagascar Thematic Group on Climate change	Environment Climate change Agriculture
Madagascar	Mrs. Hoareau Marie Marcelline	Director	Development du partanariat	Environment Coastal zone issues Agriculture
Maldives	Ms. Aishath Aileen Niyaz	Assistant Director	Climate Change Department, Ministry of Environment and Energy	Environmental analysis Energy Finance and management
Seychelles	Mrs. Dina Agnes Bristol	Programme Officer	Ministry of Environment and Energy	Water resources Health Coastal zone issues
Sri Lanka	Mr. R.A.S. Ranawaka	Deputy Director (Research and Design)	Coast Conservation Department	Coastal conservation  Biodiversity Climate change
Sri Lanka	Ms. Shireen Samarasuriya	National Coordinator	The GEF Small Grants Programme	Land degradation Water resources and quality
Sri Lanka	Kanchana Wickramasinghe	Research Economist	Institute of Policy Studies of Sri Lanka	Environmental and natural resource economics
Sri Lanka	Ms. Achala Lakmini Abayasirigunawardhana	Water Specialist	Environmental Foundation Limited	Water resources
Sri Lanka	Ms. Megal Perera	Environmentalist		Environmental science
Sri Lanka	Ms. India Arulingam	Intern	IWMI	Environmental sciences
Sri Lanka	Mr. Seshan Rodrigo	Consultant	IWMI	Environmental sciences

*Abbreviations:* GEF = Global Environment Facility, IWMI = International Water Management Institute