

CLOSING KNOWLEDGE GAPS TO SCALE UP ADAPTATION

The Lima Adaptation Knowledge Initiative

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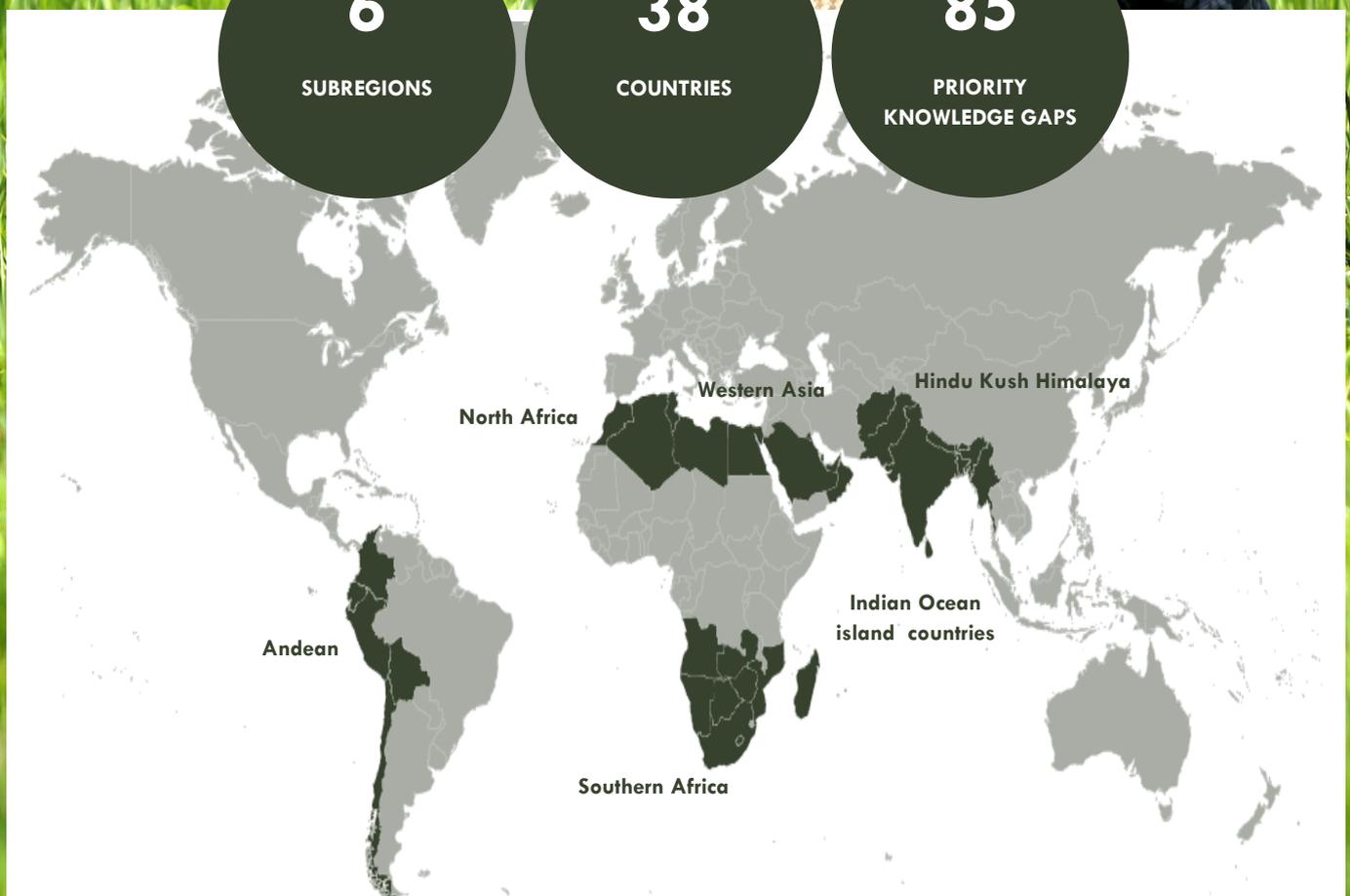
SUBREGIONS

38

COUNTRIES

85

PRIORITY
KNOWLEDGE GAPS



Whether it is the absence of knowledge, lack of access to existing knowledge or the disconnect between knowledge holders and users, knowledge gaps constitute formidable barriers to successful climate change adaptation actions. The Lima Adaptation Knowledge Initiative (LAKI) strives to help identify and prioritize adaptation knowledge gaps, and catalyze action to bridge these gaps.

This document provides an overview of the first phase of the LAKI.



United Nations
Framework Convention on
Climate Change



1. Introducing the LAKI

Climate change adaptation knowledge gaps have been repeatedly identified as a barrier to successful adaptation actions. Knowledge about adaptation is growing, yet the persistence and recurrent mentioning of such gaps suggests the need for a better alignment of the supply of and demand for adaptation knowledge, as well as for efforts to respond to adaptation knowledge gaps.

This also calls for a better understanding of these knowledge gaps based on evidence of adaptation knowledge challenges met by practitioners and policy-makers on the ground, to facilitate and catalyze the planning and implementation of efficient response actions at regional, national and sub-national levels.

Figure 1: Key characteristics of the LAKI:

Generate ownership and legitimacy for the outcome, and hence triggers or realigns the supply side (for knowledge, financial and in-kind support) to be channeled towards closing these gaps.



The benefit of consistency of application of this methodology across subregions is that it can easily evolve into a scaled-up initiative.



The "subregion" in context of the LAKI covers a connected ecosystem which can be treated as one geographic/climatic unit with shared understanding of climate impacts, which is likely to be correlated with common knowledge gaps and needs.



The LAKI aims to address knowledge barriers that impede the implementation and scaling up of adaptation action, through a participatory process of knowledge gaps identification, categorization and prioritization, accompanied by facilitated science-policy-practice dialogues to catalyze collaborations and the implementation of response actions to close these knowledge gaps in the context of various subregions and thematic domains (e.g. different sectors and areas of vulnerabilities) (see **Figure 1**).

Box 1: Scope for LAKI interventions

- Can be filled through an informed application of and/or enabling easy access to existing data, information and knowledge (e.g. through decontextualizing or re-contextualizing, processing, repackaging, synthesis and dissemination of existing data, information and knowledge to the knowledge users);
- Does not require new research or generation/collection of new data;
- Does not require action related to coordination, institutional processes or practices.

In support of the Nairobi work programme's role as knowledge-for-action network for climate resilience under the Convention, LAKI is a joint action pledge under the NWP between the United Nations Framework Convention on Climate Change (UNFCCC) secretariat and the United Nations Environment Programme (UN Environment) through its Global Adaptation Network (GAN). The LAKI interventions focus on addressing the gap that results from the deficit of accessible data, information and knowledge that is available in the needed form in the context of a specific subregion or thematic domain (e.g. a sector or area of vulnerability). Such deficit impedes the ability of policy makers and practitioners to plan and implement adaptation actions, and/or prevents "knowledge users" from adapting effectively to the adverse effects of climate change (see **Box 1**).

2. Who are our "collaborators" and "experts" during the LAKI implementation?

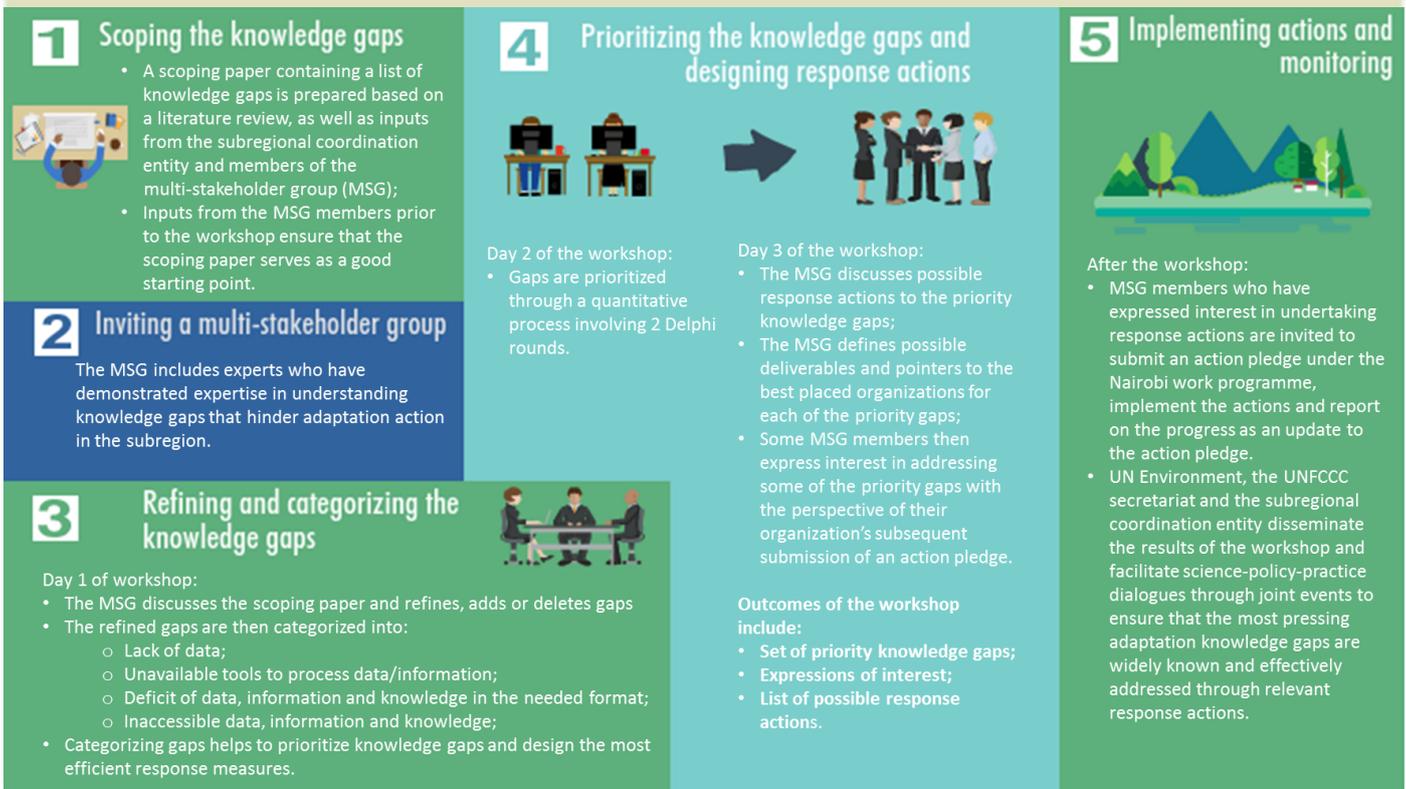
Subregional coordination entity: As regionally or thematically recognized expertise in cross-cutting environmental issues, the subregional coordination entity has a proven network of relevant partner institutions and experts, including, e.g. academia, private sector and civil society, and strong convening capacity among network members. As a core partner in the implementation of the LAKI in a target subregion, the subregional coordination entity is responsible for coordinating the hosting/organization of the workshop. The entity also collaborates with the UNFCCC secretariat and UN Environment to facilitate science-policy-practice dialogues with relevant experts and institutions through joint events to close these knowledge gaps and catalyze the implementation of response actions at various scales and follow up on response actions.

Multistakeholder group (MSG) is a group of "core" experts for the prioritization exercise. The members of this group have demonstrated relevant expertise in understanding adaptation knowledge gaps that impede adaptation action in the subregion. They would be involved in resulting adaptation action in the subregion, and would have expertise on the needs and challenges associated with ground-level implementation.

3. Methodology

The LAKI involves a rigorous methodology for each subregion to identify and prioritize adaptation knowledge gaps. This methodology is applied consistently across all six subregions (see **Figure 2**).

Figure 2: The LAKI Methodology



4. Key achievements

The UNFCCC secretariat and UN Environment in partnership with subregional coordination entities have convened six priority-setting workshops. These workshops focused on six subregions. The workshops covered a total of 38 countries, of which 3 are small island developing States (SIDS), 11 least developed countries (LDCs), and 13 African countries (see subregional profiles for an overview of the outcomes for six subregions).

The first phase of the LAKI, as one of the modalities under NWP, has demonstrated the following:

- Showcase multi-partners' collaborative initiative between the UNFCCC secretariat, UN Environment, and subregional entities, research institutions, academia, the COP Presidency and the Chair of the SBSTA;
- Characterize the NWP's extended function in producing priority knowledge gaps and in catalyzing actions to remove knowledge barriers through both "robust" knowledge assessment process and successful collaborative partnership;
- Highlight the objectiveness of the LAKI process in producing the authoritative list of priority knowledge gaps (which generates ownership and legitimacy for the outcome and hence triggers or aligns the supply side for knowledge, financial and in-kind support to be channeled to closing these gaps).

5. An overview of the priority-setting workshop results

This overview identifies priority knowledge gaps (hereafter referred to as "priority gaps") by cluster, thematic area and subregion. More specifically, it analyzes the priority gaps by four clusters or conditions under which the priority gaps emerge (see **Box 2**). In the context of the LAKI, second and third clusters fall broadly under the scope for the LAKI interventions.

While the LAKI workshop results span across numerous thematic areas, this analysis focuses on the thematic areas with the highest or geo-specific concentration of priority gaps. It also presents the priority gaps according to the six LAKI subregions – Andean, Gulf Cooperation Council (GCC)/Western Asia, North Africa, Southern Africa, Indian Ocean island countries, and Hindu Kush Himalaya.

Within the above parameters, the overview evaluates a total of 80 priority gaps, with a view to advancing collaborative opportunities and catalyzing response actions to help bridge these priority gaps in the most timely and resource efficient way possible.

5.1 Common priority knowledge gaps

Commonality, for the purpose of this analysis, refers to priority gaps that are identical or similar in terms of the description of a knowledge gap within a thematic area and a cluster. **Figure 3** details the common priority gaps within each of key thematic areas and clusters. For example, lack of data on the impacts of climate change on human health is a common priority gap in both Andean and Western Asian subregions.

Agriculture, as a thematic area, has one of the highest concentrations of priority gaps. A quarter of agriculture-related priority gaps concentrates in the same cluster, and these are due to lack of access to existing technologies, traditional and indigenous knowledge. Another five of the 24 agriculture-related priority gaps exist because of lack of actionable knowledge. These common priority gaps in Southern African, Hindu Kush Himalayan, and Western Asian subregions include lack of actionable knowledge on the sensitivity of agro-ecological zones, appropriate climate risk management, and climate-smart agriculture as the characteristics of these common agriculture-related priority gaps.

With regards to water, lack of access to existing knowledge on water-related hazards (e.g. drought, landslide, debris flow, flooding, glacier lake outburst flood) and lack of information on climate change impacts on the water resources have resulted in three common water-related priority gaps in the Hindu Kush Himalayan and North African subregions.

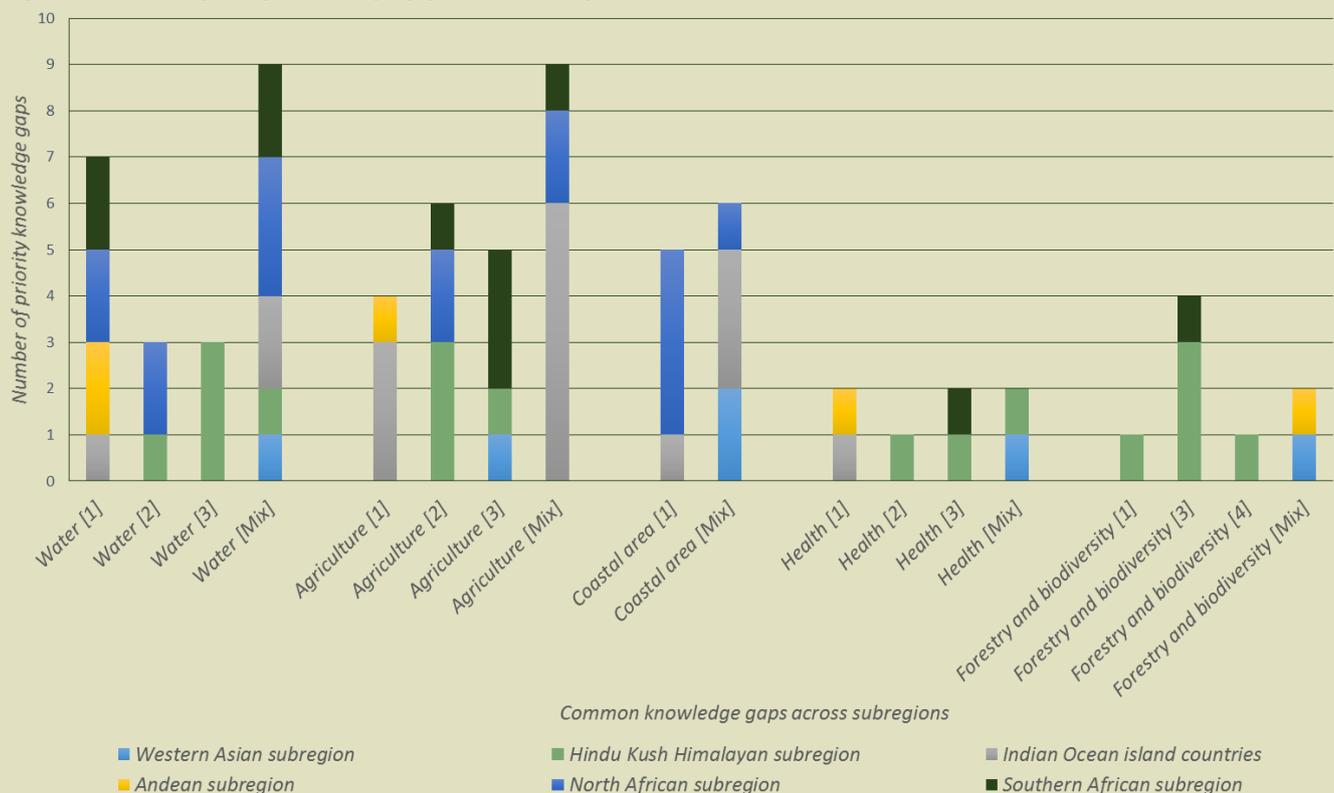
Common priority gaps in relation to forestry and biodiversity are lack of actionable knowledge on the impacts of climate change on forestry and biodiversity in Southern African and Hindu Kush Himalayan subregions.

These common priority gaps represent cost effective and efficient pathways for collaborative opportunities to scale up climate change adaptation actions as the actions required to close these priority gaps could either be identical or similar.

Box 2: Priority gap cluster:

- [1] – Lack of data (or limited data);
- [2] – Lack of access to existing knowledge;
- [3] – Lack of actionable knowledge (e.g. in need of repackaging existing knowledge);
- [4] – Lack of tools and methods to process knowledge into actionable form;
- [Mix] – An additional cluster, referred to as mix, captures priority gaps that fall under combination of two or more of the four clusters.

Figure 3: Common priority knowledge gaps across subregions



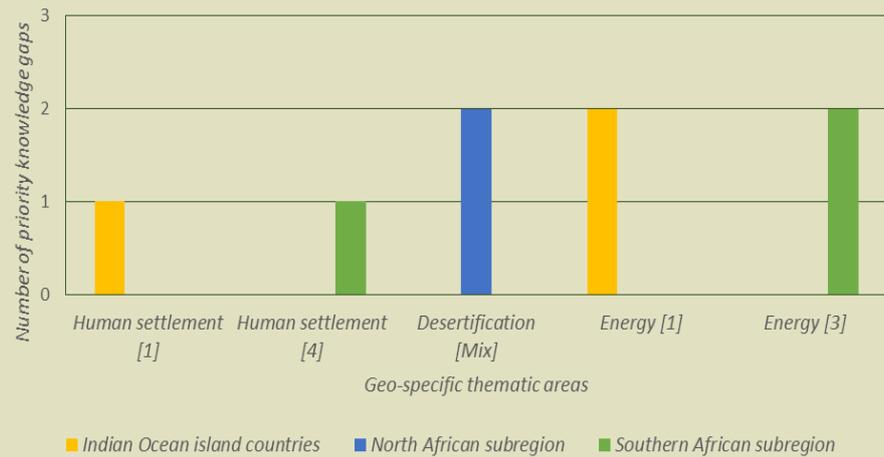
5.2 Geo-specific priority knowledge gaps

While some of the priority gaps spread across multiple subregions, others tend to be concentrated within a single or few geographical regions. As shown in **Figure 4**, priority gaps in thematic areas, including human settlement, desertification, and energy, are exclusively concentrated within one or two subregions.

All of the priority gaps on energy and human settlement are concentrated in the Indian Ocean island countries and Southern African subregion, while priority gaps on desertification are only found in North African subregion.

Geo-specificity is not only noticeable in terms of thematic areas, but also in terms of clusters and knowledge users. Southern Africa and Indian Ocean island countries each has two energy-related priority gaps. While the former describes these priority gaps as lack of actionable knowledge, the latter attributes them to lack of data. In addition, the MSG for the priority-setting workshop in Southern Africa identified national energy planners as the knowledge users for these priority gaps, yet the MSG in the Indian Ocean island countries identified policymakers and energy suppliers as the knowledge users.

Figure 4: Geo-specific knowledge gaps by thematic area



The geographical specificities of the priority gaps may become particularly relevant when allocating climate change adaptation-related resources and formulating response actions in these subregions.

5.3 Inter-related priority gaps

Priority gaps are considered inter-related to each other, when closing one priority gap contributes to the remediation of another or to a group of other priority gaps. Inter-related priority gaps can be found across thematic areas and subregions. For example, a water-related priority gap in North Africa, an energy-related priority gap in Southern Africa, and a health-related priority gap in Andean subregion lack knowledge on the impact of climate change on water resources. Closing any one of these three priority gaps through disseminating information, especially in locally accessible and actionable format, on successful water resource management practices will most likely help bridge the other two gaps.

The inter-relationship amongst priority knowledge gaps is as much across thematic areas and subregions as it is within a single thematic area and subregion. Southern African and Hindu Kush Himalayan subregion each has one health-related priority gap due to lack of actionable knowledge. More specifically, the former describes the knowledge gap as “lack of knowledge on relationship between climate change and human health including the geographic distribution of human diseases”, while the latter refers to the similar knowledge gap as “lack of understanding of potential health co-benefits of climate change adaptation and mitigation measures in various sectors”.

Similarly, the priority-setting workshop has prioritized three water-related priority gaps in the Hindu Kush Himalayan subregion. These three priority gaps fall under the same cluster of lack of access to actionable knowledge, and thus requiring repackaging of existing information. Closing either one of these priority gaps will most likely help close the other gap. Consequently, these inter-related priority gaps could be low-hanging fruits for impactful and resource-efficient climate change adaptation actions.

6. Next steps

The second phase of the LAKI will include two aspects:

- Continue catalyzing collaborations and the implementation of response actions to close the priority gaps in the context of the six subregions covered in the first phase of the initiative;
- Reaching out to research institutions and academia, including PROVIA in closing the priority gaps that are due to lack of data/or limited data, and due to lack of tools and methods to process knowledge into actionable form.
- Implement the LAKI in new subregions, particularly in vulnerable developing countries such as the LDCs, SIDS and African States.



LIMA ADAPTATION KNOWLEDGE INITIATIVE: SUBREGIONAL PROFILES

ANDEAN SUBREGION

SOUTHERN AFRICAN SUBREGION

NORTH AFRICAN SUBREGION

WESTERN ASIAN SUBREGION

HINDU KUSH HIMALAYAN SUBREGION

INDIAN OCEAN ISLAND COUNTRIES SUBREGION

I. SUBREGIONAL PROFILE FOR THE ANDEAN SUBREGION

Partnership with the International Center for Tropical Agriculture (CIAT)

1. Context

Facing multiple challenges presented by climate change, the five Andean subregion countries (see **Box 1**) covered by the LAKI urgently need to improve their knowledge of climate change adaptation to implement and scale up actions. To this end, the identification and evaluation of the existing adaptation knowledge gaps represent essential steps in bridging such gaps and better adapting to climate change. The LAKI held its first pilot priority-setting workshop from **24-26 September 2014, Bogota, Colombia** in the Andean subregion to facilitate the assessment and prioritization of the knowledge gaps hindering adaptation.

Box 1: Countries covered by the LAKI in the Andean subregion



2. Scoping paper – an initial input to the priority-setting workshop

The scoping paper, a review and summary of the existing literature on climate change adaptation in the subregion, identified 37 adaptation knowledge gaps. These gaps were initially categorized into five thematic areas of scientific research and climate observation, impacts on production sectors, capacity-building and participation, land use, planning and risk management, and public policies and institutions.

3. Priority-setting workshop

The workshop was convened over the course of three days. A multidisciplinary stakeholder group (MSG), comprising 17 experts, refined and prioritized 13 adaptation knowledge gaps intended for the diverse groups of knowledge users, who would benefit from closing these priority gaps. The MSG members were affiliated with national organizations of Colombia, Ecuador, Peru and Chile, and with regional organizations engaged in research and actions on adaptation to climate change in the Andean subregion.

The priority-setting workshop proceeded as follows:

Step 1: Refining the pool of knowledge gaps

The MSG refined and categorized the gaps identified in the scoping paper by adding, deleting, merging and/or refining knowledge gaps in thematic groups. By doing so, the experts refined the initial list of knowledge gaps contained in the scoping paper into a pool of 50 adaptation knowledge gaps for which they then carried out the prioritization exercise.

Step 2: Prioritizing the knowledge gaps

For prioritizing the adaptation knowledge gaps, the MSG agreed on a set of evaluation criteria and their individual weights (see **Figure 1**). These criteria then served as the basis on which the 50 knowledge gaps were prioritized.

Figure 1: Criteria and their weights for prioritization of knowledge gaps



Over the course of two Delphi rounds, the MSG refined and prioritized a total of 13 knowledge gaps. According to the nine criteria, the closing of these gaps would yield the most benefits for the subregion (see **Table 2** on priority gaps and **Figure 2** for distribution of gaps by thematic area).

Step 3: Designing possible response actions

As a third step of the workshop, the MSG suggested potential response actions in closing these priority gaps and provided pointers to best placed organizations to undertake these actions. In relation to the clusters the priority gaps fall into, a look at the gaps identified for the Andean subregion demonstrates differences as well as commonalities within and across thematic areas (see **Table 1**).

4. Implementing actions to close knowledge gaps

Following actions have been undertaken in the Andean subregion:

- **Dissemination of the outcomes**
 - Outcomes of the priority-setting workshop and the full workshop report were disseminated through the **Adaptation knowledge portal** (see: www4.unfccc.int/sites/NWP/Pages/LAKI-South-America.aspx)
 - CIAT Side event in Durban
- **Science-policy-practice dialogue to discuss the priority gaps and response actions to close the knowledge gaps**
 - Adaptation Knowledge Day organized by GAN, UN Environment, 2015 (see: www.asiapacificadapt.net/sites/default/files/event/attach/AKD6.pdf)
 - Event during GAN meeting in Latin America (see: www.ctc-n.org/sites/default/files/GAN_Workshop_Report_Final.pdf)

Figure 2: Number of knowledge gaps by thematic area

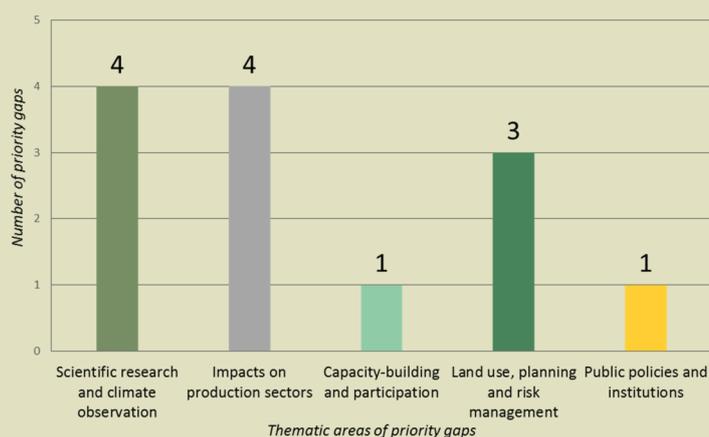


Table 1: Exemplary overview of priority knowledge gaps, discussed response actions and best placed implementing organization

Priority knowledge gaps (Differences by cluster within same thematic area)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gaps (4) and (6) both fall under impact on production sectors	Priority gap (4) is due to a lack of data and of tools and methods	Study the impact of climate change on sectorial and national economies; conduct a cost-benefit analysis of adaptation measures on the basis of the countries' national, sectorial, and subnational plans for adaptation	Acknowledgement of these different gap clusters ensures that the best placed implementing organizations working on impact and production sectors are selected with respect to their capacities to deliver these distinct responses
	Priority gap (6) is due to a lack of data and of access	Creation of an online database to store national socio-economic information for key sectors	
Priority knowledge gaps (commonalities by cluster within different thematic areas)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gap (12) falls under capacity-building and participation , priority gap (13) falls under public policies and institutions	Priority gap (12) arises from a lack of access and tools and methods	Identify existing networks and structures (mapping of networks, actors and institutions) working with territorial planning and land use associations in local communities	Acknowledgement of the same gap cluster allows the targeted selection of a singular best placed implementing organization with respect to its capacity to deliver these two response actions in two distinct thematic areas
	Priority gap (13) arises from a lack of tools and methods	Identify existing networks and structures (mapping of networks, actors and institutions) working with territorial planning and land use	
Priority knowledge gaps (Common priority gaps across subregions)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gap (3) falls under scientific research and climate observation	Priority gap (3) arises from a lack of data	Conduct research on the effects of climatic variables on the impacts of vector and water diseases associated with climate change; strengthen statistical information systems on health and climate, and incorporate them in the decision-making processes	Priority gap (3) as well as the lack of data it arises from is common across multiple LAKI subregions: Acknowledgement of the same knowledge gap in terms of gap thematic area and cluster allows the selection of one singular best placed implementing organization to tackle the gap in scale across the subregions or the promotion of collaborative efforts

Table 2: Priority knowledge gaps for the Andean¹ subregion

No.	Thematic area	Gap Description	Cluster	Knowledge user
1)	Scientific research and climate observation	Gaps in integrated research on the effects of climate change on ecosystem services, and their relationship with the quality of life of populations	Lack of data, lack of actionable knowledge (e.g., in need of repackaging existing knowledge), lack of tools/methods	Authorities and ministries for water and irrigation, human consumption, enterprises for drinking water and hydro-energy, ministries and agencies for planning, authorities for the environment, carbon markets, authorities for the environment, plant breeders
2)	Land use, planning and risk management	Scarcity of mechanisms for including adaptation in current planning tools	Lack of tools/methods	National government (different parts of the government and different ministries), local governments, public institutions, academia, civil society (including NGOs), Andean regional entities
3)	Scientific research and climate observation	Lack of data and information on health and associated variables, and on the impact of climate change on health in the Andean subregion	Lack of data	National and subnational governments, universities, NGOs
4)	Impacts on production sectors	Lack of economic information and cost-benefit analyses needs for adaptation	Lack of data, lack of tools/methods	National and subnational governments, universities, NGOs
5)	Land use, planning and risk management	Gaps in methodologies for promoting processes that facilitate multi-sectoral adaptation	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge), lack of tools/methods	National and local governments
6)	Impacts on production sectors	Gaps in socio-economic information for evaluating the impact of climate change	Lack of data, lack of access	National government (different parts of the government and different ministries), local governments, public institutions, academia, civil society (including NGOs)
7)	Impacts on production sectors	Scarcity of sectoral analyses on the costs of climate change and on the investment needs for adaptation	Lack of data	National and local governments
8)	Land use, planning and risk management	Gaps in information on tools for territorial planning and land use	Lack of data, lack of tools/methods	National and local governments, academia: universities and relevant research centers, private sector: trade and associations, civil society, including NGOs, organizations for cooperation
9)	Scientific research and climate observation	Gaps in the analyses of social variables, and of supply and demand for water, associated with different climate change scenarios	Lack of data	National and local governments
10)	Impacts on production sectors	Scarcity of information and of analyses relating to the impact of climate change on agricultural and livestock production systems	Lack of data	Regional governments, national government (different parts of the government and different ministries), local governments, public institutions, academia, civil society, including NGOs
11)	Scientific research and climate observation	Gaps in research and the exchange of knowledge on techniques, and in the optimization of technologies for managing hydric resources and adapting to the effects of climate change	Lack of data	Authorities and ministries for water and irrigation, human consumption, enterprises for drinking water and hydro-energy, ministries and agencies for planning, authorities for the environment, carbon markets, authorities for the environment, plant breeders
12)	Capacity-building and participation	Absence of mechanisms for the dissemination of knowledge on adaptation to local communities	Lack of access, lack of tools/methods	Local governments, academia, universities, private sector; farmer associations, civil society, including NGOs
13)	Public policies and institutions	Lack of tools to enhance systematization of existing experiences on adaptation	Lack of tools/methods	n/a

¹ Based on discussion held during the priority-setting workshop, the secretariat has reviewed the outcomes of various subregions and grouped the priority knowledge gaps under four clusters.

II. SUBREGIONAL PROFILE FOR THE SOUTHERN AFRICAN SUBREGION

Partnership with SouthSouthNorth (SSN)

1. Context

Standing at the frontlines of climate change, the Southern African countries covered by the LAKI urgently need to take action on adaptation. Identifying and assessing the existing adaptation knowledge gaps constitute essential steps towards sustainable action on climate change. Hence, the third priority-setting workshop covering eight countries in the subregion was held from **16-18 November 2015, Johannesburg, South Africa** (see **Box 2**).

2. Scoping paper – an initial input to the priority-setting workshop

The scoping paper included 52 adaptation knowledge gaps derived from a literature review of the published information on knowledge gaps for the following thematic areas: agriculture and food security, forestry and biodiversity, water resources, fisheries, energy, meteorological data, settlements and infrastructure, and health.

3. Priority-setting workshop

Over the course of a three-day workshop, the multidisciplinary stakeholder group (MSG) refined and prioritized 16 adaptation knowledge gaps for the diverse knowledge users. The MSG consisted of ten core experts with various backgrounds including NGOs, the private and public sector and research institutions working on crosscutting as well as sector-specific adaptation challenges in the subregion.

Box 2: Countries covered by the LAKI in the Southern African subregion

	Angola
	Botswana
	Lesotho
	Mozambique
	Namibia
	South Africa
	Zambia
	Zimbabwe

The priority-setting workshop proceeded as follows:

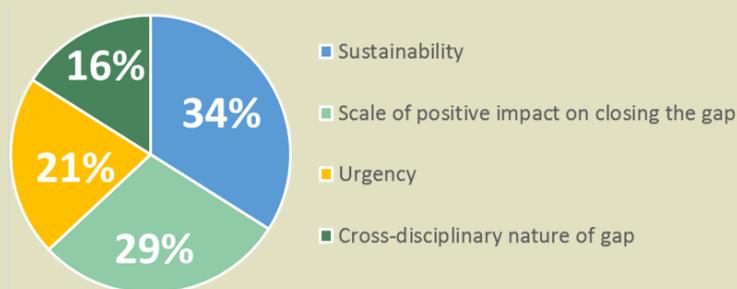
Step 1: Refining the pool of knowledge gaps

The MSG refined and categorized the gaps identified in the scoping paper by adding, deleting, merging and/or refining knowledge gaps in thematic groups. The initial pool of knowledge gaps identified in the scoping paper was then refined into 45 adaptation knowledge gaps for the prioritization exercise.

Step 2: Prioritizing the knowledge gaps

The MSG agreed on the following criteria and aggregated weights for prioritizing the adaptation knowledge gaps (see **Figure 3**). Subsequently, these criteria were used to prioritize the 45 knowledge gaps through two Delphi rounds. In effect, the MSG refined and prioritized 16 knowledge gaps; closing these gaps would yield the most tangible and sustainable benefits (see **Table 4** on priority gaps and **Figure 4** for distribution of gaps by thematic area).

Figure 3: Criteria and their weights for prioritization of knowledge gaps



Step 3: Designing possible response actions

The third step of the workshop centered around the discussion of potential response actions and best placed organizations to respond to the priority gaps. Concerning the clusters the priority gaps fall into, a look at the gaps identified for the Southern African subregion reveals differences as well as commonalities within and across thematic areas (see **Table 3**).

4. Implementing actions to close knowledge gaps

Following actions have been undertaken in the Southern African subregion:

- **Dissemination of the outcomes**

- Outcomes of the priority-setting workshop and the full workshop report were disseminated through the **Adaptation knowledge portal** (see: <http://www4.unfccc.int/sites/NWP/Pages/LAKI-Africa.aspx>)

• **Science-policy-practice dialogue to discuss the priority gaps and response actions to close the knowledge gaps**

- UNEP Side Event at COP21 on the LAKI in the Southern African subregion with panelists from CDKN, the Adaptation Committee, ICCCAD, EPA Ghana, UNEP-DEPI and UNFCCC (2015) (see: www.afdb.org/fileadmin/uploads/afdb/Documents/Events/COP21/Abstracts/03_Dec_2015_-_Lima_Adaptation_Knowledge_Initiative.pdf)

Figure 4: Number of knowledge gaps by thematic area

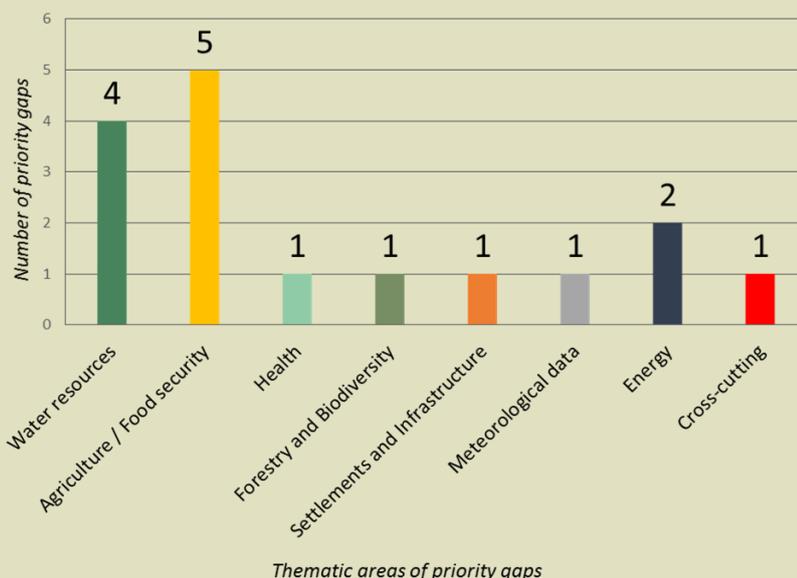


Table 3: Exemplary overview of priority knowledge gaps, discussed response actions and best placed implementing organization

Priority knowledge gaps (Differences by cluster within same thematic area)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gaps (3) and (4) both fall under agriculture/food security, the biggest group of priority knowledge gaps	Priority gap (3) due to a lack of actionable knowledge	Integration of climate-sensitivity in agro-ecological zoning guidelines	Acknowledgement of these different gap clusters ensures that the best placed implementing organizations working on agriculture/food security are selected with respect to their capacities to deliver these distinct responses
	Priority gap (4) due to a lack of access	Creation of an online database	
Priority knowledge gaps (Commonalities by cluster within different thematic area)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gap (11) falls under meteorological data/information, priority gap (12) falls under settlements and infrastructure	Priority gap (11) arises from a lack of tools and methods	Training on integration of climate model results into decision-making	Acknowledgement of the same gap cluster allows the targeted selection of a singular best placed implementing organization with respect to its capacity to deliver these two response actions in two distinct thematic areas
	Priority gap (12) arises from a lack of tools and methods	Workshops to promote understanding on integrating climate science into spatial planning	
Priority knowledge gaps (Common priority gaps across subregions)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gap (1) falls under water resources, the second biggest group of priority knowledge gaps	Priority gap (1) arises from a lack of data	Scoping study of vulnerability assessments and production of vulnerability maps	Priority gap (1) as well as the lack of data it arises from is common across multiple LAKI subregions: Acknowledgement of the same knowledge gap in terms of gap thematic area and cluster allows the selection of one singular best placed implementing organization to tackle the gap in scale across the subregions or the promotion of collaborative efforts

Table 4: Priority knowledge gaps for the Southern African² subregion

No.	Thematic area	Gap Description	Cluster	Knowledge user
1)	Water resources	Lack of knowledge on the vulnerability of and impacts of climate change on river basins and watershed systems	Lack of data	River basin authority, department responsible for water resources management
2)	Cross-cutting	Lack of information on available adaptation options for agriculture	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Farmers and extension officers
3)	Agriculture/ Food security	Lack of knowledge on the sensitivity of agro-ecological zones across the sub-region to historic and future climate change	Lack of actionable knowledge (e.g., need to repackage existing knowledge)	National planners, land managers, small holder farmers
4)	Agriculture/ Food security	Lack of knowledge in implementing appropriate climate risk management strategies for agriculture	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Small holder farming communities, extension workers
5)	Water resources	Lack of knowledge on the vulnerability of and impacts of climate change on river basins and watershed systems	Lack of data	National committee for disaster management; extension workers
6)	Agriculture/ Food security	Lack of usable knowledge products on short and long-term meteorological data and seasonal forecasting for agriculture planning	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	National and regional water planners, (River basin authority, department responsible for water resources management)
7)	Water resources	Lack of clear information on the relative contribution of natural variability, climate change and other human impacts on trends in the hydrological cycles	Lack of data, Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Agricultural extension department, extension workers and farmers
8)	Agriculture/ Food security	Limited knowledge on technologies available for adaptation in the agricultural sector	Lack of access	Water resource planners, climate change department, meteorological department
9)	Health	Lack of knowledge on relationship between climate change and human health including the geographical distribution of human diseases	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Small-scale farmers, extension workers, technology providers, financiers, and planners
10)	Energy	Insufficient knowledge on the climate change impacts on hydro power generation	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Ministry of Health, public health department
11)	Meteorological data/ information	Lack of knowledge on effective integration of climate model results into decision-making	Lack of tools/methods	National level energy planners
12)	Settlements	Lack of knowledge on how to integrate climate science into spatial planning	Lack of tools/methods	National level planners
13)	Energy	Lack of integrated and sustainable approach to sustainable energy planning for households	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	City planners, champions and higher education students
14)	Water resources	Inadequate access to long-term meteorological data that limit rainfall-runoff modelling for the rivers and floodplains	Lack of access, lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	National energy planners
15)	Agriculture/ Food security	Lack of knowledge on the sensitivity of agro-ecological zones across the sub-region to historic and future climate change	Lack of data, lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	National water resource planners, researchers
16)	Forestry and Biodiversity	Lack of policy relevant information on the impacts of climate change on forestry, biodiversity and structure, functions and provisions for ecosystems	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Ministry of Agriculture, crop production departments, national level extension planners

² Based on discussion held during the priority-setting workshop, the secretariat has reviewed the outcomes of various subregions and grouped the priority knowledge gaps under four clusters.

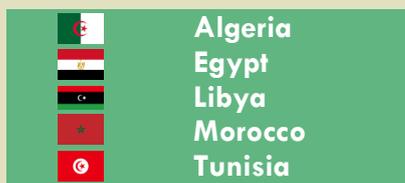
III. SUBREGIONAL PROFILE FOR THE NORTH AFRICAN SUBREGION

Partnership with Bibliotheca Alexandrina

1. Context

For the countries covered by the LAKI priority-setting workshop in the North African subregion, adaptation to climate change is essential for sustainable development in the subregion. Information on the challenges posed by climate change as well as knowledge on how to respond to these is urgently needed to catalyze action. Hence, the sixth priority-setting workshop covering five countries in the North African subregion took place from **19-21 September 2017, Alexandria, Egypt** (see **Box 3**).

Box 3: Countries covered by the LAKI in the North African subregion



2. Scoping paper – an initial input to the priority-setting workshop

The scoping paper reviewed and summarized the existing literature on adaptation knowledge gaps in the subregion and identified a total of 45 relevant adaptation knowledge gaps under the following thematic areas: water resources, coastal zones, agriculture, and desertification.

3. Priority-setting workshop

The multidisciplinary stakeholder group (MSG) reviewed, refined and extracted 18 priority gaps for various knowledge users. The MSG consisted of eight experts with a broad range of affiliations, including NGOs, the private and public sector, research institutions, and international bodies working on adaptation and climate finance in the region.

The priority-setting workshop proceeded as follows:

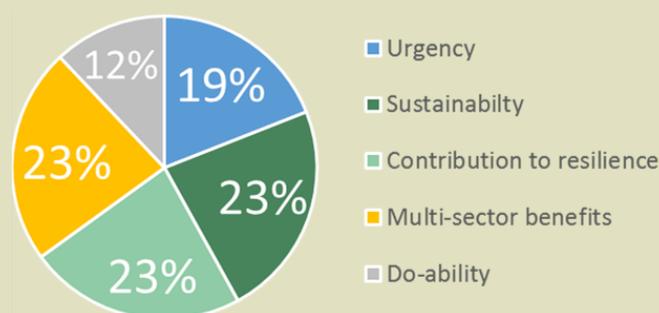
Step 1: Refining the pool of knowledge gaps

The MSG members refined and categorized the knowledge gaps identified in the scoping paper by adding, deleting, merging and/or refining knowledge gaps in thematic groups. Thereby, the experts generated an initial list of 43 adaptation knowledge gaps. This pool of knowledge gaps served as the basis of the prioritization exercise.

Step 2: Prioritizing the knowledge gaps

The MSG agreed on five criteria for the prioritization of the adaptation knowledge gaps and individually assessed the importance of each criterion. These individual assessments were then aggregated to determine the relative weights for the criteria (**Figure 5**). The MSG prioritized each of the initial 43 knowledge gaps against these criteria, and generated a final list of 18 priority gaps. Closing these priority gaps would result in the most tangible and impactful adaptation benefits for the North African subregion (see **Table 6** on priority gaps and **Figure 6** for distribution of gaps by thematic area).

Figure 5: Criteria and their weights for prioritization of knowledge gaps



Step 3: Designing possible response actions

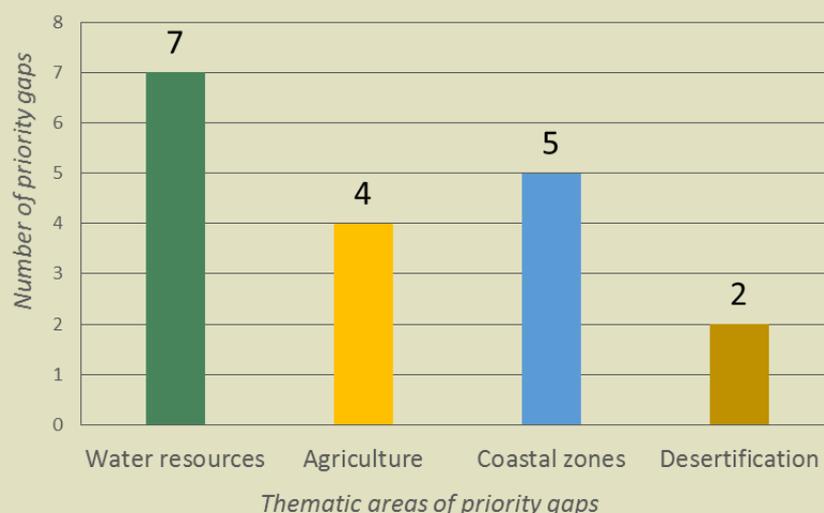
As a third step, the MSG defined potential response actions to close the 18 priority gaps and potential best placed implementing organizations to undertake these actions. The priority gaps identified for the North African subregion display differences as well as commonalities across the thematic areas (see **Table 5**).

4. Implementing actions to close knowledge gaps

Following actions have been undertaken in the North African subregion:

- **Dissemination of the outcomes**

- Outcomes of the priority-setting workshop and the full workshop report were disseminated through the **Adaptation knowledge portal** (see: www4.unfccc.int/sites/NWP/Pages/LAKI-Africa.aspx)

Figure 6: Number of knowledge gaps by thematic area**Table 5: Exemplary overview of priority knowledge gaps, discussed response actions and best placed implementing organization**

Priority knowledge gaps (Differences by cluster within same thematic area)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gaps (16) and (18) both fall under water resources, the biggest group of priority knowledge gaps	Priority gap (16) due to a lack of data	Document, compile and disseminate information on technologies and best practices	Acknowledgement of these different gap clusters ensures that the best placed implementing organizations working on water resources are selected with respect to their capacities to deliver these distinct responses
	Priority gap (18) due to a lack of access	Update existing regional database and publish data	
Priority knowledge gaps (Commonalities by cluster within different thematic area)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gap (9) falls under agriculture, priority gap (10) falls under desertification	Priority gap (9) arises from a lack of access and actionable knowledge	Workshops and group discussions, meetings for local farmer groups and co-operatives, including seminar for policy makers to address	Acknowledgement of a similar gap cluster allows the targeted selection of a singular best placed implementing organization with respect to its capacity to deliver these two response actions in two distinct thematic areas
	Priority gap (10) arises from a lack of access and actionable knowledge	Top down and bottom up information exchange	
Priority knowledge gaps (Common priority gaps across subregions)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gap (4) falls under water resources, the biggest group of priority knowledge gaps	Priority gap (4) arises from a lack of data and access	Preparation of outputs of projection models and share on knowledge hub at national level (met offices) and also at regional level; policy brief to researchers to allow availability of data	Priority gap (4) as well as the lack of data and lack of access it arises from is common across multiple LAKI subregions: Acknowledgement of the same knowledge gap in terms of gap thematic area and cluster allows the selection of one singular best placed implementing organization to tackle the gap in scale across the subregions or the promotion of collaborative efforts

Table 6: Priority knowledge gaps for the North African³ subregion

No.	Thematic area	Gap Description	Cluster	Knowledge user
1)	Agriculture	Lack of access to data related to rain-fed agriculture and irrigated agriculture	Lack of access	Researchers, scholars
2)	Water resources	Lack of accessible information on climate change impacts on the water resources	Lack of access	Water sector managers and policy makers
3)	Water resources	Limited understanding of climate variability and trends, including placing current observations into historical context	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge), lack of tools/methods	Water infrastructure designers
4)	Water resources	Insufficient knowledge on rainfall historical data, trends and projections	Lack of data, lack of access	Water resource planners
5)	Desertification	Insufficient knowledge and information sharing on solutions/good practices and lessons learned to combat desertification	Lack of data, lack of access	Water infrastructure designers
6)	Agriculture	Lack of awareness on negative climate change impacts on yield	Lack of access	Water resource planners
7)	Coastal zones	Lack of information for developing resilience strategies in urban planning in coastal zones	Lack of data	Ministries of Agriculture
8)	Water resources	Lack of accurate information on water resources status (i.e. water availability, consumption patterns, water quality)	Lack of data	Ministries of Water
9)	Agriculture	Lack of awareness on negative climate change impacts on livelihoods	Lack of access, lack of actionable knowledge (e.g., need to repackage existing knowledge)	Farmers organizations, local authorities
10)	Desertification	Insufficient information and knowledge about interconnections between desertification and socio-economic development	Lack of data, lack of actionable knowledge (e.g., need to repackage existing knowledge)	Government, agricultural and rural advisory services providers
11)	Agriculture	Limited information and knowledge sharing on interlinkages with other sectors	Lack of access, lack of actionable knowledge (e.g., need to repackage existing knowledge)	Decision makers, policy makers and planners
12)	Coastal zones	Limited knowledge on the benefits of integration of coastal management and protection into national development plans and priorities	Lack of data, lack of actionable knowledge (e.g., need to repackage existing knowledge)	River basin agencies, environmental institutions, and water resource planners
13)	Coastal zones	Need for improved information regarding population dynamics within SLR models	Lack of data	Farmers organizations, local authorities
14)	Coastal zones	Lack of information on understanding of risks due to SLR among the different coastal zones	Lack of data	Central authorities of demographic statistics
15)	Coastal zones	Need for improved information on technologies to protect coastal cities against SLR.	Lack of data	Ministry of Agriculture
16)	Water resources	Limited knowledge on technologies and best practices to adapt to the impacts of climate change on water resources	Lack of data	Policy makers and planners
17)	Water resources	Lack of reliable data on water-quantity and quality, including accessibility to available reliable data and databases	Lack of data, lack of access	Policy makers and planners
18)	Water resources	Limited access to available data on water-quantity and quality	Lack of access	Policy makers and planners

³ Based on discussion held during the priority-setting workshop, the secretariat has reviewed the outcomes of various subregions and grouped the priority knowledge gaps under four clusters.

IV. SUBREGIONAL PROFILE FOR THE WESTERN ASIAN SUBREGION

Partnership with Abu Dhabi Global Environmental Data Initiative (AGEDI)

1. Context

Climate change already imposes serious threat to countries in the Western Asian subregion, which was covered by the second LAKI priority-setting workshop. As for adaptation, substantial knowledge gaps on the challenges and solutions have been repeatedly identified as impediments to successful action on climate impacts. The second priority-setting workshop covering six countries in the subregion was held from **15-17 June 2015, Abu Dhabi, United Arab Emirates** (see **Box 4**).

2. Scoping paper – an initial input to the priority-setting workshop

The scoping paper identified 24 adaptation knowledge gaps under six thematic areas: water resources, ecosystems (terrestrial and marine), coastal zones, public health, security, and cross-cutting through a literature review.

Box 4: Countries covered by the LAKI in the Western Asian subregion

	Bahrain
	Kuwait
	Oman
	Qatar
	Saudi Arabia
	United Arab Emirates

3. Priority-setting workshop

Using this pool of adaptation gaps as starting point, the multidisciplinary stakeholder group (MSG) refined and prioritized ten adaptation knowledge gaps for various knowledge users. The MSG constituted 18 experts with diverse background, including the private and public sector, civil society organizations, and most prominently, regional research institutions and academia.

The priority-setting workshop proceeded as follows:

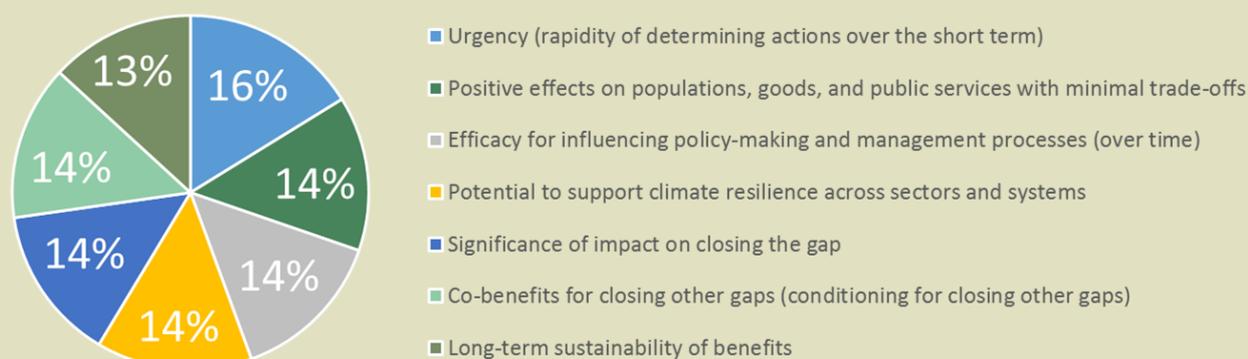
Step 1: Refining the pool of knowledge gaps

The MSG refined and categorized the gaps identified in the scoping paper by adding, deleting, merging and/or refining knowledge gaps in thematic groups resulting in 72 adaptation knowledge gaps for the prioritization exercise.

Step 2: Prioritizing the knowledge gaps

The MSG defined seven criteria. The ranking of these criteria by individual MSG members resulted in following aggregated weights for the criteria (see **Figure 7**). Over the course of two Delphi rounds, MSG members used these criteria to prioritize 72 adaptation knowledge gaps. This resulted in ten priority gaps (see **Table 8** on priority gaps and **Figure 8** for distribution of priority gaps by thematic areas).

Figure 7: Criteria and their weights for prioritization of knowledge gaps



Step 3: Designing possible response actions

The third step of the workshop focused on potential response actions. The MSG also suggested best placed implementing organizations to carry out these response actions. The priority gaps for the Western Asian subregion reveal differences as well as commonalities across thematic areas (see **Table 7**).

4. Implementing actions to close knowledge gaps:

Following actions have been undertaken the Western Asian subregion:

- **Dissemination of the outcomes**

- Outcomes of the priority-setting workshop and the full workshop report were disseminated through the **Adaptation knowledge portal** (see: www4.unfccc.int/sites/NWP/Pages/LAKI-Asia.aspx)

Figure 8: Number of knowledge gaps by thematic area

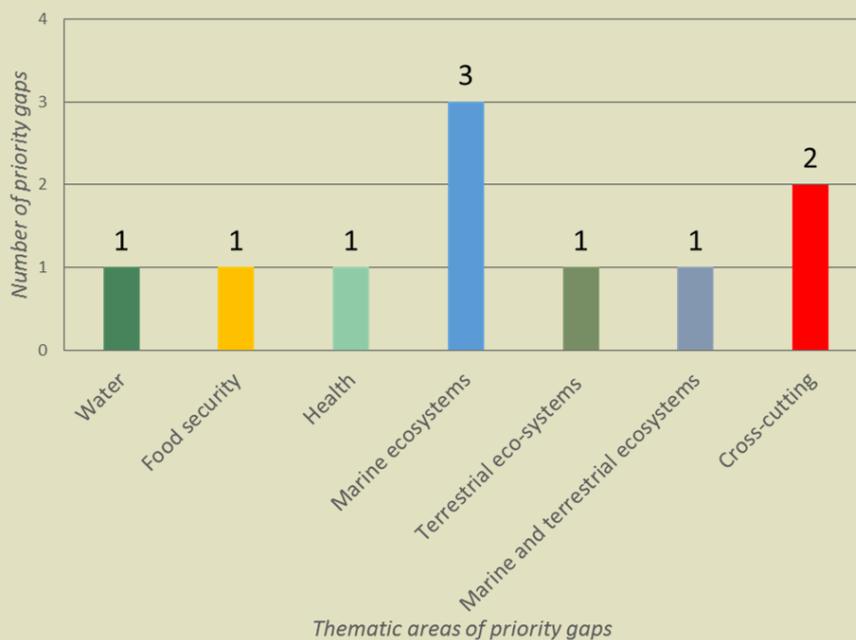


Table 7: Exemplary overview of priority knowledge gaps, discussed response actions and best placed implementing organization

Priority knowledge gaps (Differences by cluster within same thematic area)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gaps (4) and (6) both fall under marine ecosystems, the biggest group of priority knowledge gaps	Priority gap (4) due to a lack of data, lack of actionable knowledge	Habitat map ecosystem services	Acknowledgement of these different gap clusters ensures that the best placed implementing organizations working on marine ecosystems are selected with respect to their capacities to deliver these distinct responses
	Priority gap (6) due to a lack of access and of actionable knowledge as well as tools/methods	Joint program for capacity building	
Priority knowledge gaps (Commonalities by cluster within different thematic areas)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gap (1) falls under water, priority gap (8) falls under health	Priority gap (1) arises from a lack of data and access	Well-trained personnel and technical people; well-structured national/regional databases; integrated climate and hydrological models on regional/national levels	Acknowledgement of a similar gap cluster allows the targeted selection of a singular best placed implementing organization with respect to its capacity to deliver these two response actions in two distinct thematic areas
	Priority gap (8) arises from a lack of data	Statistical reports to link between health and climate change on geographical distribution basis	
Priority knowledge gaps (Common priority gaps across subregions)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gap (1) falls under water	Priority gap (1) arises from a lack of data and access	Well-trained personnel and technical people; well-structured national/regional databases; integrated climate and hydrological models on regional/national levels; detailed technical reports and policy briefs	Priority gap (1) as well as the lack of data and access it arises from is common across multiple LAKI subregions: Acknowledgement of the same knowledge gap in terms of gap thematic area and cluster allows the selection of one singular best placed implementing organization to tackle the gap in scale across the subregions or the promotion of collaborative efforts

Table 8: Priority knowledge gaps for the Western Asian⁴ subregion

No.	Thematic area	Gap Description	Cluster	Knowledge user
1)	Water	Limited availability and access to observed data on quantity and quality of conventional (groundwater reserves, surface water, shared transboundary flows, recharge levels) and non-conventional (treated wastewater, desalinated water) water resources	Lack of data, lack of access	Decision makers, planners, media, researchers, CSO, ministries of environment, water, agriculture and energy
2)	Cross-cutting	Limited availability and lack of access to scenario data at various spatial scales for projected climatic variables, including temperature, precipitation, wind, evapotranspiration, drought, flash floods, sea level, extreme events, etc.	Lack of data, lack of access	Climate modelers, researchers, climate change stakeholders
3)	Terrestrial ecosystems	Fragmented baseline data (biological, ecological and climate) and lack of standardized methodologies for consolidating information on terrestrial ecosystems at the GCC level	Lack of data, lack of access	National implementers, environmental agencies, research institutes, public authorities, academia
4)	Marine ecosystems	Incomprehensive data and information as well as lack of integrated approaches related to climate change impacts on coastal and marine ecosystems' goods and services	Lack of data, lack of actionable knowledge (e.g., in need of repackaging existing knowledge), lack of tools/methods	Environmental hubs in the region, decision makers
5)	Marine ecosystems	Inadequate knowledge and awareness on coastal defense and protection services provided by coastal and marine ecosystems and their response to a changing climate	Lack of data, lack of access	NGO, decision-makers, academia, CSO
6)	Marine ecosystems	Insufficient technical capacity for monitoring, assessing and projecting impacts of climate change in the marine ecosystems	Lack of access, lack of actionable knowledge (e.g., in need of repackaging existing knowledge), lack of tools/methods	Municipalities, planners, policy makers
7)	Food security	Limited knowledge of climate smart agricultural practices	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Consumers and producers, farmers, decision makers, ministries of agriculture, AGU
8)	Health	Lack of information and knowledge on the direct and indirect impacts of climate change on human health	Lack of data, lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Ministries of health, faculties of medicines, syndicate of pharmaceutical, WHO, health agencies
9)	Cross-cutting	Limited knowledge on developing adaptive measures and projects	Lack of tools and methods	CSO, local communities
10)	Marine and terrestrial ecosystems	Lack of knowledge of the costs of climate change impacts and adaptation investment opportunities for sustainable development in the marine and terrestrial ecosystems	Lack of tools and methods	GCC Secretariat General Ministries

⁴ Based on discussion held during the priority-setting workshop, the secretariat has reviewed the outcomes of various subregions and grouped the priority knowledge gaps under four clusters.

V. SUBREGIONAL PROFILE FOR THE HINDU KUSH HIMALAYAN SUBREGION

Partnership with International Centre for Integrated Mountain Development (ICIMOD)

1. Context

As one of the most hazard-prone areas among global mountain biomes, the Hindu Kush Himalayan subregion is highly vulnerable to the impacts of climate change such as floods, landslides and droughts. For the eight countries covered by the LAKI Hindu Kush Himalaya, climate change poses a severe threat to their livelihoods (see **Box 5**). This is the fourth LAKI priority-setting workshop held from **20-22 October 2016, Colombo, Sri Lanka** to identify and assess the most important adaptation knowledge gaps.

Box 5: Countries covered by the LAKI in the Hindu Kush Himalayan subregion



2. Scoping paper – an initial input to the priority-setting workshop

The scoping paper included an initial list of 64 adaptation knowledge gaps categorized into the following thematic areas: agriculture, water resources, health, forest and biodiversity, and cross-cutting.

3. Priority-setting workshop

During the three-day workshop, the multidisciplinary stakeholder group (MSG) prioritized 16 adaptation knowledge gaps for various knowledge users. The 12 members of the MSG for the subregion were experts affiliated with a broad range of organizations working on adaptation in the subregion, including government agencies, academia and civil society organizations. A support group consisting of three professionals specializing in adaptation challenges related to health, agriculture, and forest and biodiversity provided additional inputs during the workshop.

The priority-setting workshop proceeded as follows:

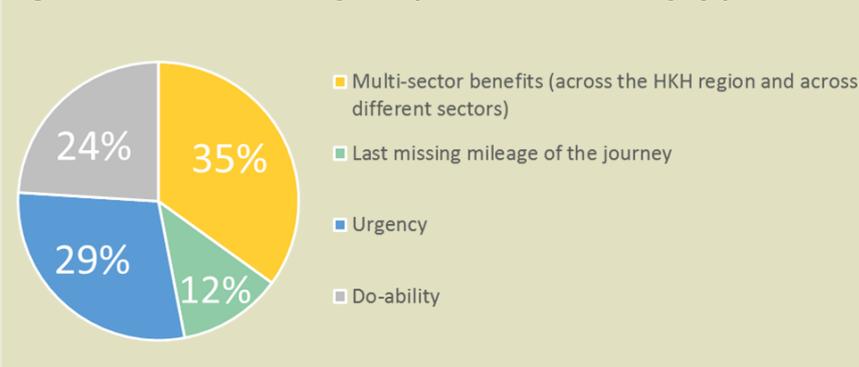
Step 1: Refining the pool of knowledge gaps

Collectively, the MSG reviewed, refined and amended the gaps identified in the scoping paper by adding, deleting, merging and/or refining knowledge gaps in thematic areas. Through this process, the initial gaps identified in the scoping paper evolved into a pool of 46 adaptation knowledge gaps.

Step 2: Prioritizing the knowledge gaps

After an intensive discussion, the MSG agreed on four criteria for prioritizing the adaptation knowledge gaps and individually ranked the importance of each criterion. The aggregated weights of the criteria are indicated in **Figure 9**. Over the course of two Delphi rounds, MSG members used these criteria to prioritize the 46 adaptation knowledge gaps identified in step 1 resulting in 16 adaptation knowledge gaps (see **Table 10** on priority gaps and **Figure 10** for distribution of priority gaps by thematic area).

Figure 9: Criteria and their weights for prioritization of knowledge gaps



Step 3: Designing possible response actions

For the third step of the workshop, the MSG members were invited to provide potential response actions and potential organizations best placed to implement the response actions to close the priority gaps. Additionally, two examples (i.e. the Adaptation learning highway and the Educational Partnerships for Innovation in Communities Network-Model) were presented to illustrate innovative approaches to closing the gaps. In contrast to other subregions, several of the priority gaps in the Hindu Kush Himalayan subregion are highly geo-specific and related to local and indigenous knowledge. The priority gaps furthermore demonstrate differences as well as commonalities across thematic areas (see **Table 9**).

4. Implementing actions to close knowledge gaps:

Following actions have been undertaken in the Hindu Kush Himalayan subregion:

- **Dissemination of the outcomes**

- Outcomes of the priority-setting workshop and the full workshop report were disseminated through the **Adaptation knowledge portal** (see: www4.unfccc.int/sites/NWP/Pages/LAKI-Asia.aspx)
- Outcomes and report of the priority-setting workshop disseminated through ICIMOD (see: www.icimod.org/?q=24782)

- **Science-policy-practice dialogue to discuss the priority gaps and response actions to close the knowledge gaps**

- A joint side event by the UNFCCC secretariat, UN Environment and ICIMOD to highlight, discuss and catalyze the progress of the LAKI in the Hindu Kush Himalayan subregion, Bonn Climate Change Conference 2017 (see: www4.unfccc.int/sites/NWP/News/Pages/LAKI-side-event-SB46.aspx)

- **Action undertaken by subregional coordination entity in catalyzing or implementing actions to close priority knowledge gaps**

- ICIMOD is undertaking actions to close the priority gap 3 — i.e., lack of access to awareness-raising products and early warning systems for multiple hazards

Figure 10: Number of knowledge gaps by thematic area

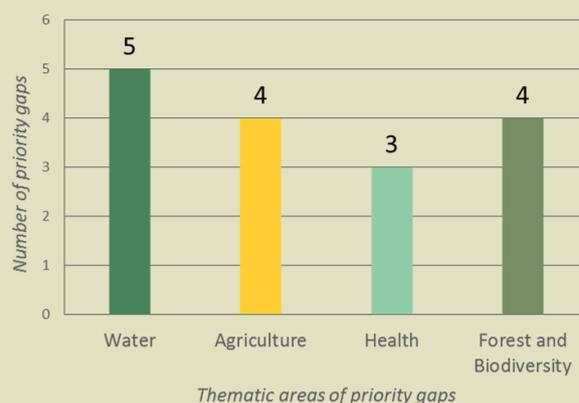


Table 9: Exemplary overview of priority knowledge gaps, discussed response actions and best placed implementing organization

Priority knowledge gaps (Differences by cluster within same thematic area)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gaps (2) and (3) both fall under water , the biggest group of priority knowledge gaps	Priority gap (2) due to a lack of actionable knowledge	Documentation repackaging, and information dissemination among multiple stakeholders and communities, including through a newsletter in the local language	Acknowledgement of these differences as well as similarities in gap clusters ensures that the best placed implementing organizations working on water are selected with respect to their capacities to deliver these distinct responses, but with a view to promoting collaborative and complementary efforts
	Priority gap (3) due to a lack of access	Producing live weather forecasts and disseminate information on climate impacts to rural communities through radio, TV, mobile applications and awareness-raising campaigns	
Priority knowledge gaps (Commonalities by cluster within different thematic area)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gap (3) falls under water , priority gap (8) falls under health	Priority gap (3) arises from a lack of access	Producing live weather forecasts and disseminate information on climate change impacts to rural communities through radio, TV, mobile applications and awareness-raising campaigns/meetings	Acknowledgement of a similar gap cluster allows the targeted selection of a singular best placed implementing organization with respect to its capacity to deliver these two response actions in two distinct thematic areas
	Priority gap (8) arises from a lack of access	As part of public service announcements being developed, health messages could be packaged and developed into TV and radio message; development of brochures, pamphlets, videos,	
Priority knowledge gaps (Common priority gaps across subregions)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gap (10) falls under water , the biggest group of priority knowledge gaps	Priority gap (10) arises from a lack of actionable knowledge	n/a	Priority gap (10) as well as the lack of actionable knowledge it arises from is common across multiple LAKI subregions: Acknowledgement of the same knowledge gap in terms of gap thematic area and cluster allows the selection of one singular best placed implementing organization to tackle the gap in scale across the subregions or the promotion of collaborative efforts

Table 10: Priority knowledge gaps for the Hindu Kush Himalayan subregion

No.	Thematic area	Gap Description	Cluster	Knowledge user
1)	Agriculture	Limited Access to adequate locally usable knowledge and information on weather and seasonal forecasting to assist farm production operations	Lack of access	Extension workers, national hydro-met services, agriculture experts
2)	Water	Weak dissemination of evidence and successful water management practices, adaptation technologies, and water allocation and management during periods of scarcity and abundance	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Water resource planners, policymakers, communities project managers
3)	Water	Lack of access to awareness-raising products and early warning systems for multiple hazards (drought, landslide, debris flow, flooding, glacier lake outburst flood in the Himalayas and downstream communities)	Lack of access	Early warning system designers, town and provincial planners/watershed managers communities
4)	Agriculture	Inadequate information and knowledge on adaptation options and technologies suitable to address context-specific climate extremes, impacts and risks for agriculture and the net effect of climate change at the local level	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Farmers, extension agencies district agriculture officers and experts, technology users, policymakers local NGOs
5)	Health	Limited access to weather and seasonal forecasting data for public health preparedness (heat waves, cold waves, thunderstorms, disease epidemics)	Lack of access, Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Health professions and public
6)	Agriculture	Limited access to traditional knowledge and indigenous knowledge on agricultural adaptation	Lack of access	Village elders, farming families, researchers, policymakers, agricultural extension workers, civil society organizations
7)	Water	Poor translations of climate data and models into understandable formats	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	National–subnational planning departments, project managers, community leaders and members
8)	Health	Lack of awareness/sensitization among public and media about climate change health impacts and adaptation/response measures.	Lack of access	Public
9)	Agriculture	Limited understanding of traditional knowledge and indigenous knowledge on agricultural adaptation	Lack of access	Climate negotiators, policymakers
10)	Water	Knowledge on how climate change is impacting on water source/usage/availability/quality (including sanitation/water treatment/water inputs for energy/springs and natural wells, groundwater, spring water and glaciers)	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Watershed planners, settlement planners/energy planners, community leaders and civil society project managers
11)	Forestry and biodiversity	Knowledge gap on methodologies and tools to quantify the impact of climate change on ecosystem services	Lack of tools and methods	Researchers, academics
12)	Health	Lack of understanding/evidence of potential health co-benefits of climate change adaptation and mitigation measures in various sectors	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Policymakers
13)	Forest and biodiversity	Lack of adequate knowledge on the effects of climate change on biodiversity	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Researchers, academics, policymakers, community members
14)	Forest and biodiversity	Need for repackaging the baseline data on the effects of climate change for forests and biodiversity for different target groups	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Researchers, academics, practitioners
15)	Forest and biodiversity	Insufficient information on local indigenous knowledge on forest management	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Researchers, academics, practitioners, community members
16)	Water	Insufficient climate change communication on impacts on water systems/availability to determine climate change impacts and inform decision-making in designing water resource plans and implementation	Lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Communities, subnational government, non-technical stakeholders

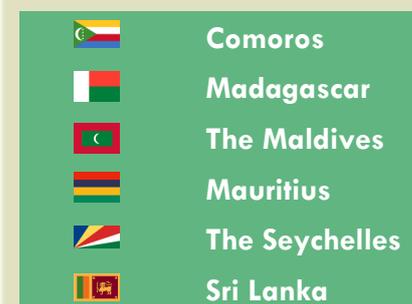
VI. SUBREGIONAL PROFILE FOR THE INDIAN OCEAN ISLAND COUNTRIES SUBREGION

Partnership with the International Water Management Institute (IWMI)

1. Context

Ranking amongst the countries most severely affected by climate change, the Indian Ocean island countries urgently need to strengthen their adaptation efforts. Information on the adaptation challenges ahead as well as knowledge on how to tackle them represents one of the most essential resources. The LAKI priority-setting workshop on adaptation knowledge gaps convened from **20-22 October 2016, Colombo, Sri Lanka** for the subregion, helped to provide valuable inputs to furthering this objective and to kick start climate action amongst the island countries (see **Box 6**).

Box 6: Countries covered by the LAKI in the Indian Ocean island countries subregion



2. Scoping paper – an initial input to the priority-setting workshop

The scoping paper reviewed and summarized the existing literature on adaptation. The scoping paper included 31 knowledge gaps under following thematic areas: water resources, agriculture (crops, fisheries, and livestock production), coastal zones and marine ecosystems, health, energy, and infrastructure and human settlements.

3. Priority-setting workshop

The three-day workshop facilitated constructive discussions among the multidisciplinary stakeholder group (MSG). The MSG consisted of 11 core experts with various backgrounds including NGOs, the private and public sector and research institutions working on crosscutting challenges such as water issues across the region. The discussion during the workshop revealed that the prioritization did not adequately reflect the needs of some countries (i.e. results were skewed towards large islands). Thus, the prioritization was done for two clusters of countries: a cluster of large Indian Ocean island countries (Madagascar, Sri Lanka) resulting in six priority gaps and a cluster of small Indian Ocean island countries (Comoros, the Maldives, Mauritius and the Seychelles) resulting in six priority gaps.

The priority-setting workshop proceeded as follows:

Step 1: Refining the pool of knowledge gaps

The MSG refined and categorized the gaps identified in the scoping paper by adding, deleting, merging and/or refining knowledge gaps in thematic groups, resulting in 38 adaptation knowledge gaps for the prioritization exercise.

Figure 11: Criteria and their weights for prioritization of knowledge gaps



Step 2: Prioritizing the knowledge gaps

The MSG agreed on four criteria for the prioritization of the adaptation knowledge gaps. These criteria were ranked individually by each MSG member and aggregated into the following weights (see **Figure 11**). The MSG used these criteria for prioritizing the adaptation knowledge gaps in two clusters of countries. Over the course of the two Delphi rounds MSG members used these criteria to prioritize the 31 adaptation knowledge gaps. This exercise resulted in 12 priority gaps for both clusters (see **Tables 12 and 13** on priority gaps and **Figures 12 and 13** for distribution of gaps by thematic area).

Step 3: Designing possible response actions

As a final step, the MSG suggested potential response actions and best placed organizations to respond to the priority gaps. Compared to the small islands, the large islands attach much higher priority to agriculture/fisheries and water resources. On the other hand, the priority gaps for smaller Indian Ocean Island countries are very different in terms of the thematic areas, with water resources being the key thematic area (see **Table 11**).

4. Implementing actions to close knowledge gaps:

Following actions have been undertaken in the Indian Ocean island countries subregion:

- **Dissemination of the outcomes**

- Outcomes of the priority-setting workshop and the full workshop report were disseminated through the **Adaptation knowledge portal** (see: www4.unfccc.int/sites/NWP/Pages/LAKI-Asia.aspx)
- Information on the priority-setting workshop disseminated by IWMI (see: www.iwmi.cgiar.org/2016/10/from-the-hindu-kush-to-the-indian-ocean/)

Figure 12: Number of knowledge gaps by thematic area (Large island countries)

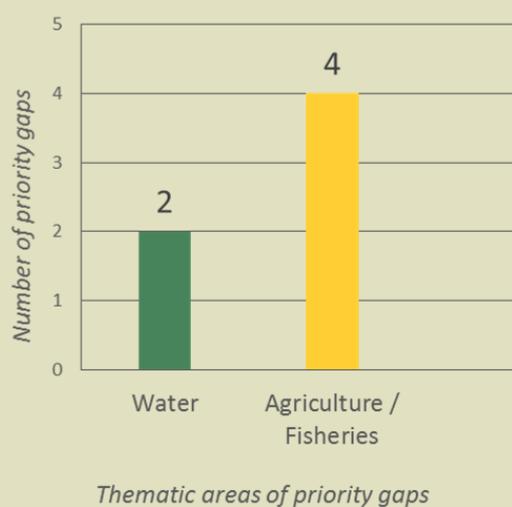


Figure 13: Number of knowledge gaps by thematic area (Small island countries)

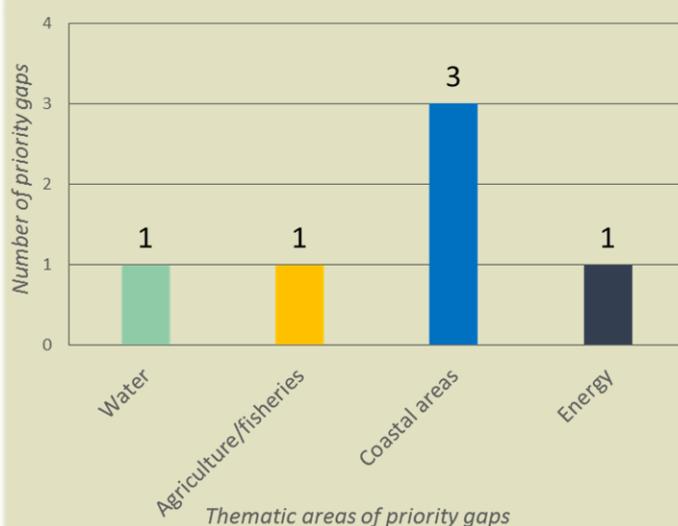


Table 11: Exemplary overview of priority knowledge gaps, discussed response actions and best placed implementing organization

Priority knowledge gaps (Differences by cluster within same thematic area)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gaps (2) and (3) from the large Indian Ocean island countries both fall under agriculture/fisheries , the biggest group of priority knowledge gaps	Priority gap (2) due to a lack of data and of access	Compilation of report or website to centralize the existing information for technical people by the ministries of agriculture and fisheries	Acknowledgement of these commonalities regarding gap clusters and response actions can allow the targeted selection of a singular best placed implementing organization working on agriculture/fisheries with respect to its capacity to deliver these
	Priority gap (3) due to a lack of data and of access, and of actionable knowledge	Compilation of report or website to centralize the existing information for technical people by the ministries of agriculture and fisheries as well as need to engage with indigenous knowledge	
Priority knowledge gaps (Common priority gaps across subregions)	Cluster	Response action/ Deliverables	Best placed implementing organization
Priority gap (5) from the small Indian Ocean island countries falls under water	Priority gap (5) arises from a lack of data and of access	Providing access to the existing information produced by the governments (e.g. in the form of a website of the meteorological department or through dissemination of this information by governments to the communities)	Priority gap (5) as well as the lack of data and access it arises from is common across multiple LAKI subregions: Acknowledgement of the same knowledge gap in terms of gap thematic area and cluster allows the selection of one singular best placed implementing organization to tackle the gap in scale across the subregions or the promotion of collaborative efforts

Table 12: Priority knowledge gaps for the Indian Ocean island countries subregion (Large islands)

No.	Thematic area	Gap Description	Cluster	Knowledge user
1)	Agriculture/ fisheries	Insufficient information on water-conserving irrigation practices and other water management techniques	Lack of data, lack of access	Agricultural planners, extension officials, small-scale farmers (gender), water/ irrigation management practitioners
2)	Agriculture/ fisheries	Insufficient information on crop and agricultural diversification	Lack of data, lack of access	Farmers, extension people, planners
3)	Agriculture/ fisheries	Insufficient information on climate-smart crop varieties	Lack of data, lack of access, lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Policymakers (local planners, government officials), farmers and agro-based industries, NGOs
4)	Water	Insufficient information on climatic parameters at the sub-basin/ catchment/ subnational level	Lack of data, lack of access	Policymakers (local planners, government officials)
5)	Water	Insufficient information on water storage capacity and status (e.g. reservoirs, tanks)	Lack of data	Policymakers (local planners, government officials), NGOs
6)	Agriculture/ fisheries	Insufficient information on cropping calendars that precisely integrate the impacts of climate change	Lack of data, lack of access, lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Policymakers (local planners, government officials), farmers and agro-based industries, NGOs

Table 13: Priority knowledge gaps for the Indian Ocean island countries subregion (Small islands)

No.	Thematic area	Gap Description	Cluster	Knowledge users
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	Lack of data, lack of access	Policymakers (local planners, government officials) from various ministries/ departments, tourism industry, NGOs, coastal communities
2)	Agriculture/ fisheries	Insufficient knowledge on how climate change affects coastal/ marine fish migration	Lack of data, lack of access	Fisheries industries, fisheries sector officials
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	Lack of data, lack of access	Policymakers (local planners, government officials) from various ministries/ departments, tourism industry, NGOs, coastal communities
4)	Coastal areas	Insufficient information on the impacts of climate change on coral reefs, including coral bleaching	Lack of data, lack of access, lack of actionable knowledge (e.g., in need of repackaging existing knowledge)	Policymakers (local planners, government officials), environmental NGOs, fishers, fisheries associations
5)	Water	Insufficient information on climatic parameters at the sub-basin/ catchment/ subnational level	Lack of data, lack of access	Policymakers (local planners, government officials)
6)	Energy	Insufficient information on the impacts of climate change on energy demand	Lack of data	Energy suppliers, policymakers/ government, NGOs