How governance affects participation: Insights from water resources planning projects in Colombia and Peru

There is a growing interest in improving the governance of natural resources to ensure both equity and sustainability. *Governance* is not the same as *government* – political authorities – but instead looks more broadly at how decisions are made and resources are managed, and the multiple actors, including civil servants and stakeholder groups, who participate in the process.[1]

Local and national water governments are increasingly reorganizing their management structures to better promote more inclusive water governance. Many have adopted participatory processes, and Integrated Water Resources Management (IWRM), a holistic approach to governing water based on stakeholder participation, has been widely embraced as a path toward sustainable and equitable water governance.[2] There has also been extensive discussion of decentralization versus centralization, the best scale for management, and whether jurisdictions should be delineated by hydrologic boundaries or political ones.[3]

Despite all these debates, water resource governance still varies greatly by scale and location and in its level of success. It is clear that no one structure fits all situations. Some have also noted that the breadth of the concept of governance, which is essential to its success, may actually inhibit progress or change in some cases.[4]

This discussion brief examines how Colombia and Peru have restructured their water and environmental governance systems in recent years. It is based on SEI's experience in supporting water resource planning and climate change adaptation processes in both countries, using an approach we call Robust Decision Support (RDS), which combines technical modelling with stakeholder engagement.

We begin by providing an overview of the reforms in both countries, then explain how the RDS process was implemented in each country and how governance structures affected stakeholder participation. Our experience suggests that even thoughtfully designed governance approaches may not fully lend themselves to effective, science-informed water policy development and implementation. Thus, approaches need to be adapted to better fit with specific governance systems.

A wide range of water-related challenges

In both Colombia and Peru, governance changes have been driven by a desire to better address changing water demands, stresses and challenges and to promote better water governance. Technically, neither country suffers from water scarcity (both are classified as "water rich" by the UN Food and Agriculture Organization[5]), but both face real threats and growing challenges associated with their water supplies.

In Peru, water resources are unevenly distributed: the most developed regions along the coast have the least available water supply, while the wettest regions – the mountains and the jungle –are not heavily populated. There is also significant competition over water resources, with growing demand from agriculture as well as from the mining industry, creating challenges that cut across multiple basins and governance scales.[6]

P2-Crianza de Truchas - Pacaipampa / © David Gálvez Paucar Flickr CC BY-NC-ND 2.0

A trout farmer in Pacaicampa, in Peru's Piura department, one of the places where SEI has applied its Robust Decision Support (RDS) approach.

Colombia faces its own set of issues, such as extensive flooding and landslides, agricultural and industrial pollution, and balancing the adverse impacts of hydropower with its significance as the country's main source of electricity.

For both Peru and Colombia, this means that modern water governance systems are increasingly important, as water management issues exacerbate vulnerability to climate change and disaster risks and could hinder sustainable development.

Water governance in Colombia

Law 99, approved in 1993, called for a complete overhaul of Colombia's environmental management agencies and broader governance system. It decentralized the environmental regulation process and required nongovernmental entities to be involved in decision-making.[7]

The law created the National Environmental System (Sistema Nacional Ambiental – SINA), along with governing bodies at the national and subnational levels,[8] as shown in Figure 1. The new Ministry of the Environment and Sustainable Development (Ministerio de Ambiente y Desarrollo Sostenible – MADS), was created to oversee the National Environmental System. The MADS is responsible for setting national environmental regulations including pollution standards, charge structures and fines; establishing environmental criteria to be incorporated in the formulation of sectoral policies and other

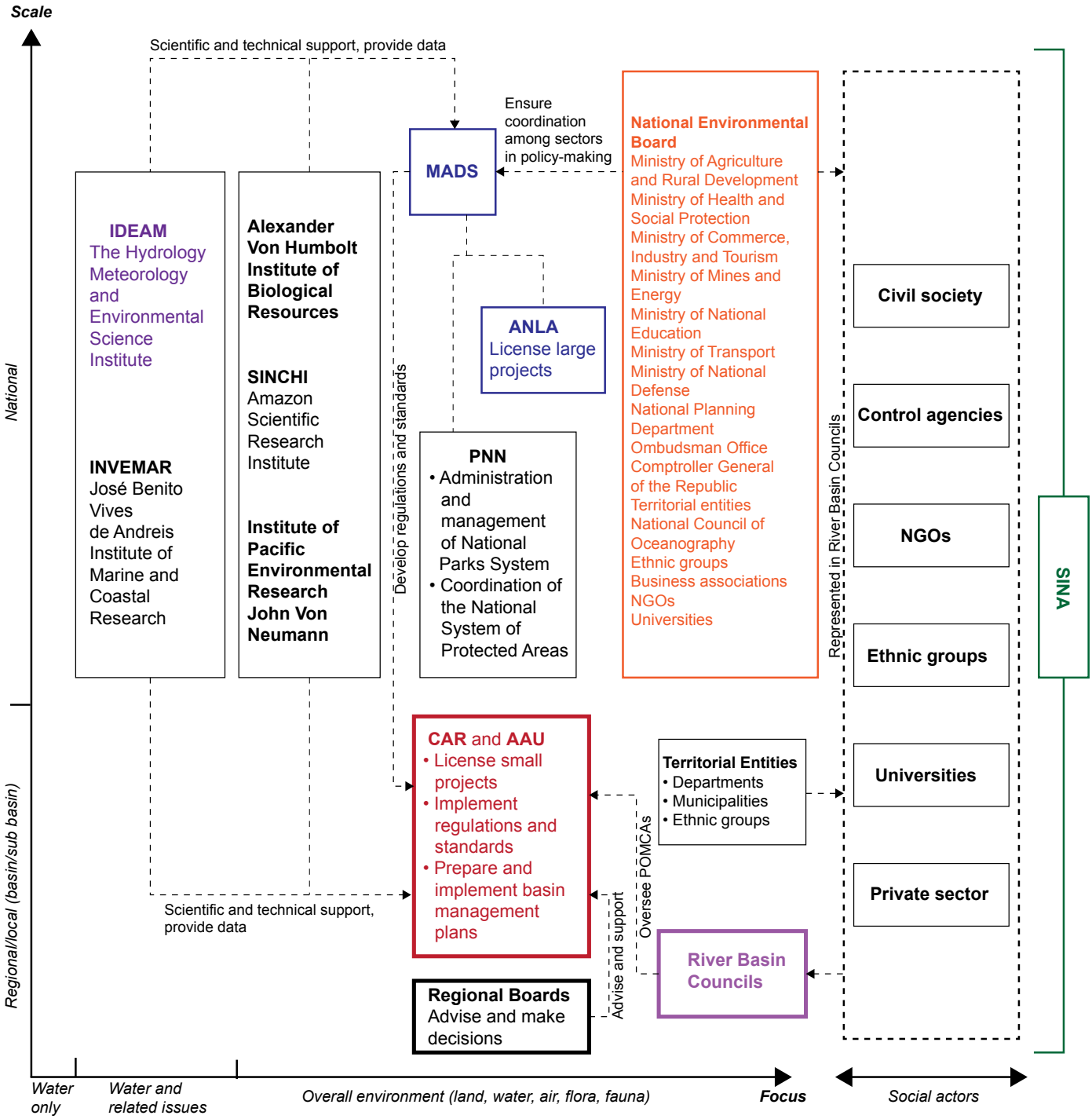

Figure 1: Key institutions in water and environmental governance in Colombia
Solid arrows signify political authority between two entities, dotted lines signify supportive relations between two entities.

agencies' planning processes; and developing methodologies for reviewing environmental license requests.

Law 99 also created two key institutions that provide scientific and technical support for water resources management: The Hydrology, Meteorology and Environmental Science Institute (Instituto de Hidrología, Meteorología y Estudios Ambientales – IDEAM) is a national research institution and the keeper of official national environmental data, which it supplies to all other governing agencies. The Institute of Marine and Coastal Research José Benito Vives de Andreis (Instituto de Investigaciones Marinas y Costeras– INVEMAR) conducts research on renewable natural resources and coastal, marine and oceanic ecosystems.

The two institutes support MADS with research that contributes to the development of and amendments to environmental regulations and standards. The National Authority of Environmental Licensing (Autoridad Nacional de Licencias Ambientales – ANLA) supports the ministry in managing the environmental licensing process, and granting environmental licenses to large projects and activities.

Environmental and water resource regulations set by the Ministry are implemented mainly at the regional level, by the Regional Autonomous Corporations (Corporaciones Autónomas Regionales – CARs), which are responsible for managing the area within the political-administrative boundaries of each department (a subnational jurisdictional area) as well as setting their own regulations, standards and fees (which must be at least as stringent as those set nationally).

Departments are further broken down into municipalities; in municipalities with populations greater than 1 million, Urban

Environmental Authorities (Autoridades Ambientales Urbanas – AAUs) work in coordination with the CARs. When a basin extends beyond a political boundary, such as a department boundary, then all CARs within the basin must work together to manage the basin.

The CARs each are required to have a regional board made up of representatives from regional departments, municipalities, NGOs, businesses, ethnic groups, Afro-Colombian communities as well as national representatives from MADS, the Ministry of Agriculture and Rural Development, National Planning Department and the presidency.

The CARs are responsible for protecting the environment by developing and implementing policies, plans and programmes on environmental issues and granting concessions, permits, authorizations and licenses. Licensing is a key aspect of environmental protection and regulation in Colombia. A license is required for "the execution of a project, work or activity… which may cause severe deterioration of renewable natural resources or the environment or introduce considerable or notorious modifications to the landscape".[9]

At the national level, the ANLA manages licenses for large projects, while CARs do so at the regional level, for smaller projects and water uses within their jurisdiction. The licenses granted by the CARs make up the majority of licenses granted in the country. There are clear limits that define whether a license falls under the ANLA's or a CAR's jurisdiction.

In addition to licensing, the CARs protect the environment within their jurisdiction by developing various watershed management plans, the most important is the River Basin Management and Development Plan (Plan de Ordenación y Manejo de Cuenca Hidrográfica – POMCA). CARs can also establish reserves of environmental resources, and once a reserve is established, no licenses may be issued for the extraction or use of the reserved resource.[10]

While POMCAs are being developed, a group of actors or representatives from different groups such as water user associations, indigenous and Afro-Colombian communities, agricultural, mining, and industrial guilds, water and sewer service providers, non-governmental organizations (NGOs), universities, associations of farmers, rural residents, fishermen and others form a guiding group called a River Basin Council. Once the POMCA is approved, this group continues acting as the guiding body overseeing the implementation of POMCA projects and activities.

Water governance in Peru

In 2009, Peru approved the Water Resources Law (Ley de Recursos Hídricos), which overhauled what had been a highly fragmented governance structure to better align with changing water uses and increasing demand, such as growing export-oriented agriculture sector, municipalities, hydropower and mining.[11]

The new law shifted water resources management at the national level from the Ministry of Agriculture (water allocation and use for irrigation), the Ministry of Housing (drinking water and wastewater), the Ministry of Health (water quality), and the Ministry of Energy and Mines (water contamination in relation to extractive industries) to one entity attached to the Ministry of Agriculture, called the National Water Authority (Autoridad Nacional del Agua – ANA), which has a national, regional and local presence (see Figure 2).

The ANA is the main authority of the National Water Resource Management System (Sistema Nacional de Gestión de los Recursos Hídricos – SNGRH), the system of all public institutions and users with responsibilities and functions related to water management. The SNGRH is part of the National Environmental Management System (Sistema Nacional de Gestión Ambiental – SNGA), the Peruvian counterpart to Colombia's SINA. The SNGA aims to ensure the effective implementation of environmental objectives in public entities.

Like Colombia, Peru has tried to foster cross-agency cooperation and inclusion. The ANA has a board that includes representatives from the Ministry of Agriculture, Ministry of Environment, Ministry of Housing, Construction and Sanitation, Ministry of Energy and Mines, Ministry of Production, Ministry of Health, National Maritime Authority, regional departments, municipalities, agricultural and non-agricultural water users, farmer communities and ethnic groups.

The functions of the ANA include overseeing and managing natural water sources; granting, modifying and revoking water use rights; evaluating environmental instruments such as management plans; authorizing construction work in natural water sources, and authorizing the release or reuse of treated wastewater. Subnational jurisdictions are delineated by river basin. There are 14 Administrative Water Authorities (Autoridad Administrativa del Agua – AAA), one for each basin defined for management, and 71 Local Water Authorities (Autoridad Local del Agua – ALA) to support the corresponding AAA within each sub-watershed.[12]

The AAAs and ALAs, with the River Basin Councils, support the implementation of the water law and of policies

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A facilitator works with stakeholders in Colombia to identify uncertainties and challenges to be addressed in regional water resource planning.

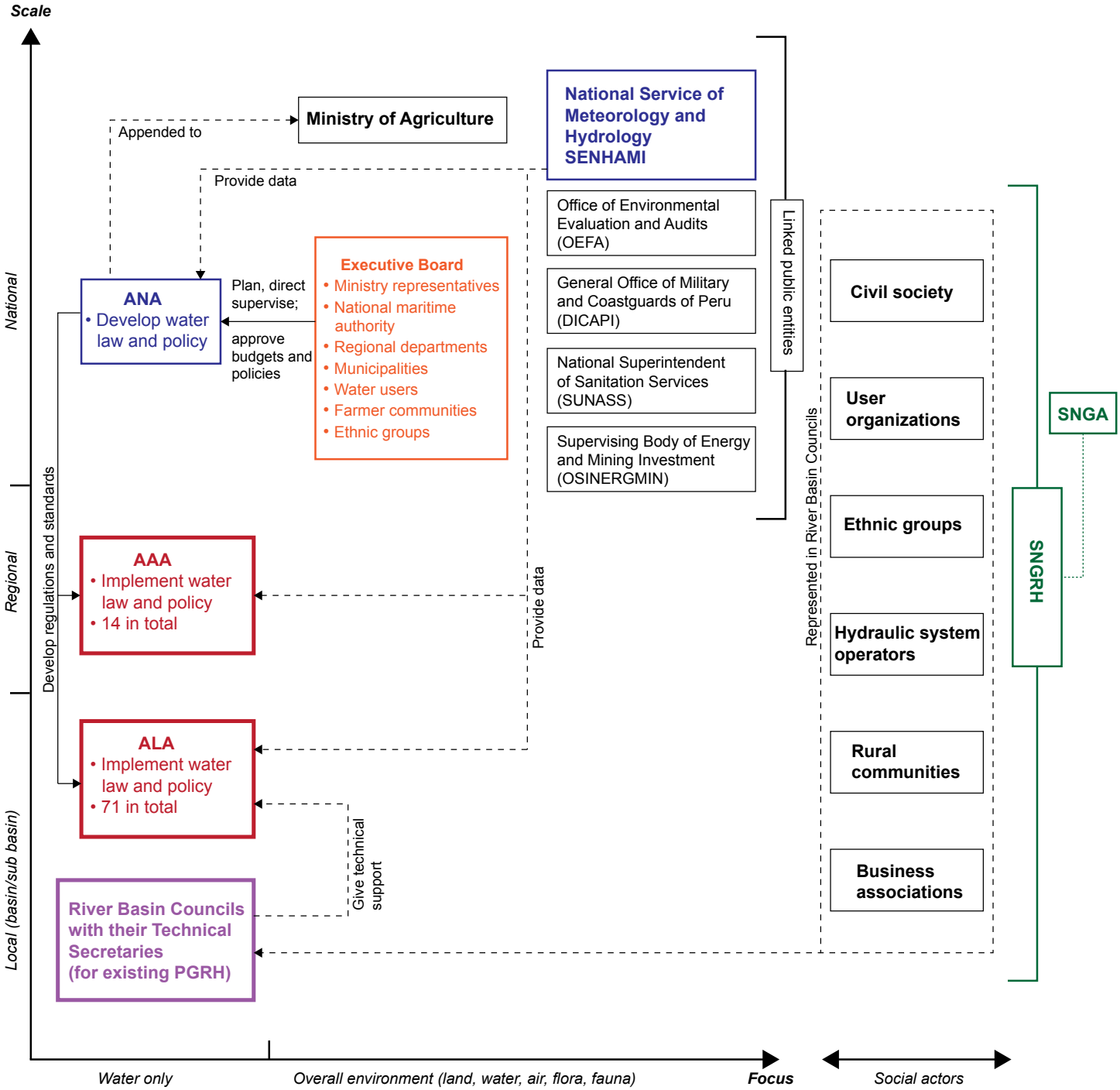


Figure 2: Key institutions in water and environmental governance in Peru
Solid arrows signify political authority between two entities, dotted lines signify supportive relations between two entities.

developed by the ANA. Unlike in Colombia, the regional and local authorities are not autonomous, but rather work under the direct authority and funding of the ANA. Also, these authorities only manage water and are not responsible for other types of environmental and natural resource management and regulation.

Along with the Water Resources Law, Peru has four key policy instruments for basin management: the National Environmental Policy, the National Water Resources Policy and Strategy, the National Water Resources Plan, and Basin Water Resources Management Plans (Planes de Gestión de Recurso Hídrico de Cuenca – PGRHC). The latter are developed by the AAAs and implemented by the ALAs. The River Basin Councils that work with the AAAs and ALAs have a technical secretariat responsible for developing and executing technical work to promote the formulation, monitoring, evaluation and implementation of the PGRHCs and other operations.

The basin-level plans in Peru are similar to the POMCAs in Colombia, which are developed and implemented locally by the CARs. The main difference between the two is that the POMCAs take a broader approach to the environment (water as well as land use, vegetation and wildlife), while the plans in Peru focus only on water.

In addition, in Peru the plans are approved at the national level by the ANA and then implemented locally, while in Colombia they are approved and implemented autonomously by the CARs. Similar to the IDEAM in Colombia, the National Service of Meteorology and Hydrology (Servicio Nacional de Meteorología e Hidrología – SENAHMI) provides data to the other governing bodies.

SEI's Robust Decision Support (RDS) approach

One of the most valuable outcomes of the 7th World Water Forum,[13] along with greater political commitment to water, was the recognition of the importance of science and technology in implementing water policy. SEI developed RDS in an effort to support successful water management strategies and policies.

RDS is an eight-step process that builds on the robust decision-making approach developed by the RAND Corporation, combining it with extensive stakeholder engagement and quantitative modelling. RDS is used to assess vulnerabilities with regard to water resources and identify and evaluate potential management strategies to address those vulnerabilities. Figure 3 provides an overview.[14]

The RDS process is designed to support decision-making under uncertainty. It builds on and includes the IWRM principles of participatory decision making.[15] The entire process can take between 12 and 24 months. In both Colombia and Peru, actors were identified through the River Basin Councils.

The first three steps of the RDS process involve identifying key actors and engaging with them to formulate the problem, using the RAND Corporation's XLRM framework:

- X (e**X**ogenous factors) represents the uncertain factors – either environmental, social or political – outside the direct control of the actors within a particular decision making process but which have the potential to influence outcomes. For instance, many water system planners face uncertainties related to climate change, urbanization and demographic changes.

- L (**L**evers) represents the specific actions that are available to these actors as they seek to improve conditions or outcomes in the face of future uncertainty. These may be actions defined within the POMCA in Colombia or the PGRHC in Peru.

- R (**R**elationships) corresponds to relationships between the watershed system, the uncertainties and the management actions, which we represent using hydrologic models. Models allow us to quantify the impacts of management actions under uncertainty using metrics of performance.

- M (**M**etrics of Performance) are the means by which individual actors will evaluate the outcomes associated with a specific action considered as part of the decision-making process.

In step 4 of the RDS process, SEI uses its Water Evaluation and Planning System (WEAP)[16] to develop a watershed model of the area, including the hydrology, water uses, existing political structures and government institutional arrangements regulating water use.

The plausible future ranges of the uncertain exogenous factors – physical or social – are quantified (step 5) and then simulated as scenarios in the model along with the actions or levers (step 6). Using metrics defined by the stakeholders, the outcomes of the model runs can be evaluated and compared (step 7) to determine which action should be implemented (step 8), or to develop new actions to be analysed (return to step 5).

These final steps (5–8) are an iterative process, so that modelling and analysis can be used to inform new actions, which are then evaluated and analysed through modelling until a sufficient (in terms of achieving management objectives) and feasible action is identified and decisions can be made.

RDS implementation in Colombia and Peru

SEI applied the RDS process in Colombia and Peru with support from development technical assistance programmes (including from the U.S. Agency for International Development and the Inter-American Development Bank) and with participation from governments, academics, civil society and the private sector.

In Colombia, SEI worked with the CARs and River Basin Council representatives in the La Vieja and Alto Magdalena watersheds to incorporate climate change analysis in the development of POMCAs.

In Peru, the work was done with the Technical Secretariats of the River Basin Councils in the Quilca-Chili, Chira-Piura and Chancay-Lambayeque watersheds in 2015–2016, incorporating climate analysis into the PGRHCs.

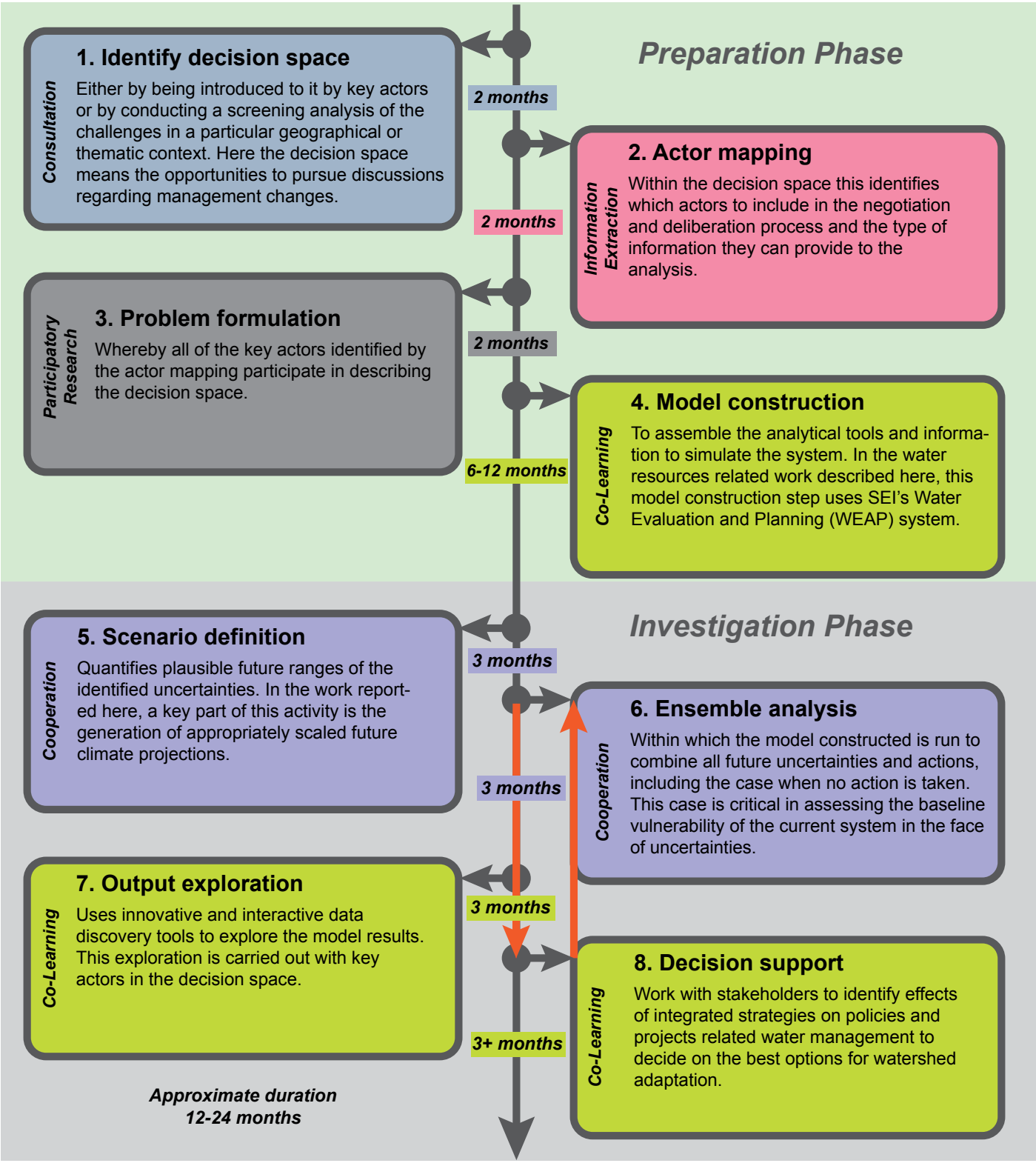
In both countries, the RDS process was generally well received, and government agencies and individual staff were interested in and eager to learn new tools and practices. The RDS process can help advance the existing management plans (POMCAs and others in Colombia, and PGRHCs and others in Peru) by simulating the impacts of the activities in the plans under climate change and other uncertainties in WEAP. The actions and uncertainties are defined by stakeholders during the participatory process. The quantified performance metrics resulting from the WEAP model runs are explored with stakeholders so that a deep level of understanding of the basin can be reached.

Potential adaptation actions identified in the two countries included conserving watersheds, defining environmental flows, managing wetlands, building new storage infrastructure, improving hydropower design and operations, treating and reusing urban and agriculture wastewater, reducing unaccounted-for water extraction, and improving irrigation efficiency. The technical analysis and participatory processes enabled the institutions to test the performance of different combinations of adaptation actions, and to make a strong case for financing the best combinations to achieve more resilient watershed management.

Implications of governance structures for implementing RDS

In both places, the government entities which contribute technical knowledge and expertise to these plans (the Technical Secretariats in Peru and the CARs in Colombia) were at the centre of the RDS process. This enabled them to fully benefit from the capacity-building aspects of the work – e.g. learning to use a WEAP model – as well as from the discussions to formulate the problem, identify possible strategies, and then analyse the model results.

In Peru, however, the implementing entities (AAAs and ALAs) were less involved in the RDS process and did not get the same benefits as Technical Secretariat staff who were participating more regularly.



Increased participation

Participation level legend	Example
Participatory (Action) Research	Research is directed by participants, with the researcher acting as a facilitator
Co-Learning	Working together to define problems and find solutions
Cooperation	Working with people to determinate priorities, but the process is directed by the researchers
Consultation	Local opinions are sought and some dialogue occurs
Information Extraction	Researchers ask people questions and process the information

Figure 3: Diagram of the Robust Decision Support (RDS) process

Adapted from Escobar and Purkey (2016)[17]

In both countries, the RDS process also involved an array of non-government actors, who welcomed the opportunity to ensure that their concerns were considered in decision-making. In Colombia, these actors were consistently involved, as their participation fit with their role in River Basin Council activities. Academics benefited by learning new tools and incorporating their use in classes and research, and civil society and private-sector participants learned new ways to analyse river basin scenarios and the outcomes of integrated water resource management alternatives.

A similarly broad range of actors participated in Peru, with academics assimilating the tools and analytical approaches, and civil society and private-sector representatives benefiting from the quantification of the outcomes of implementing different strategies.

Notably, however, although Colombia and Peru have both developed (different) government structures to promote participation in decision-making, some aspects of both those structures actually hindered participation in RDS, which is designed to support better and more participatory decision-making.

In the case of Colombia, the CARs are responsible for both the development of and the implementation of management plans. This makes it somewhat easier, from a management perspective, to engage people involved in both planning and implementation, as they are all part of a single entity.

However, the CARs are responsible not just for water management, but for other environmental management, and also for various technical and administrative tasks. There are only so many people with the technical expertise to participate, and given their broad responsibilities, it is difficult to ensure that enough people can engage consistently in RDS throughout the two-year process. Funding restrictions may also limit people's availability. We found that insufficient participation and support from management and directors of the CARs somewhat reduced the success of RDS project implementation.

In Peru, strategies and management plans are approved at the national level, by the ANA, but they are implemented at the basin and local levels by the AAAs and ALAs, respectively, working with the River Basin Councils. This means that ensuring people involved in both planning and implementation are also involved in the RDS process requires including three different governing bodies as well as the River Basin Councils. This requires extensive cooperation and logistical coordination between the entities over a two-year period.

The agencies in Peru have an advantage, however, in that the relevant entities are all solely focused on water and therefore may have greater availability to devote to RDS than the CARs in Colombia. Being one connected system, they also may have sufficient funding to participate consistently.

Still, we found that although there are individuals within the Technical Secretariat who focus entirely on technical analyses involving water, they have too little time available to learn and implement the tools. They are also limited in their power, as their role is only to support and advise decision-makers, but they do not have the authority to make decisions themselves.

Moreover, the Technical Secretariats' participation may have inhibited the participation of less technical, but more locally knowledgeable professionals from the AAAs and ALAs. In the Chira-Piura basin, for example, some professionals from the ALAs and AAAs and other entities formed a group to work together and train others in WEAP on their own. They showed great interest in the tool but only were invited to WEAP trainings and to participate when professionals from the Technical Secretariat were unable to attend.

While the issues in the two countries are different and stem from differing structures within the governing bodies, participation could potentially be improved by establishing agreements with key authorities at different levels of government in each country at the start of the project. These agreements may designate a certain amount of time and resources to specific individuals so that they may be committed to learning and implementing WEAP and participating consistently in the entire process.

Because WEAP is a complex tool that takes time to learn, and because participation is essential to the success of RDS, ensuring that people can consistently and reliably participate is necessary not just for a good outcome, but to ensure the continued use of the tools once the RDS process is completed. Having a strong group of people in key agencies who are part of the RDS process can also help ensure continuity if the work extends beyond a government's or agency leader's term in office. Assurance that the RDS process can continue and that the same individuals can participate regardless of changes in agency leadership is very important for the success of the process.

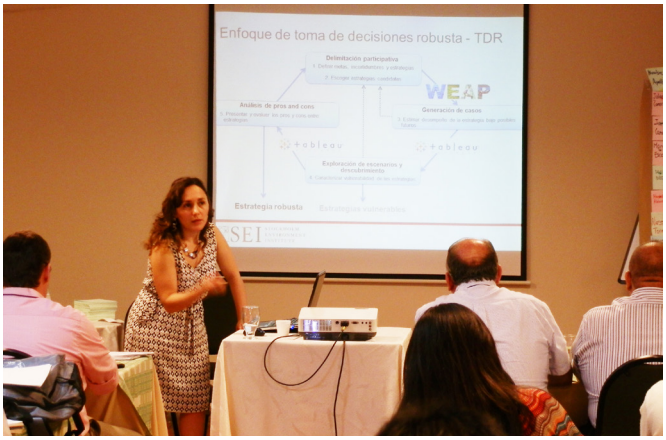
At the same time, because the process focuses so heavily on modelling with WEAP, stakeholders without the requisite technical skills, such as farmers' groups or other grassroots organizations, may not have sufficient opportunities to contribute. Thus, the process could be improved to enable these actors to play a larger role.

Inadequate data availability has also been a hindrance to the RDS process. It may be that because the organizations which manage data in each of the countries (IDEAM and SENAHMI) do not directly benefit or are not directly involved in the process of RDS, they may be less motivated to promptly supply the data needed to develop the WEAP models. Alternatively, the complex bureaucracy and associated processes for requesting data may inhibit obtaining data. Directly involving these organizations, not just as data suppliers, but also in the data processing and analysis of RDS, could increase their engagement and result in faster response times.

Conclusion

SEI's experiences applying RDS in Colombia and Peru have provided valuable insights on how different governance structures may influence the success of a participatory, but also technically complex planning process. The positive perceptions of RDS and WEAP by policy actors suggests that although there were some challenges resulting from governance structures, the process was well received by the individuals who participated.

Future projects would benefit from more reliable and consistent participation across all the relevant agencies. Specifically, increased involvement from the national level of government



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SEI's Marisa Escobar explains the RDS process to stakeholders at a project workshop in Colombia.

in Colombia and from non-technical staff, local officials and people with decision-making authority in Peru would have been beneficial. Including data-supplying organizations in both countries may also better promote and advance the success of RDS.

It is essential that besides securing the inclusion and participation of officials from different levels of government in both countries, provisions are made to ensure that those individuals will have the time and resources to devote to RDS, and will be able to do so for the duration of the process, even if there is a change in government. For other actors such as academics, civil society and private sector, the key is to motivate their participation and promote the use of the new tools and learning in their understanding of water sector adaptations.

Endnotes

1 See, for example, Norman, E.S., Cook, C., and Cohen, A. (2015). *Negotiating Water Governance: Why the Politics of Scale Matter*. Ashgate Publishing Ltd. They define governance as "the process in which multiple-actors, including civil servants and stakeholder groups, participate in the decision making process" (p.3).

2 For an overview of IWRM, see the Global Water Partnership's website: http://www.gwp.org/the-challenge/what-is-iwrm/.

Some examples of IWRM and participatory water governance models include:

U.S. Army Corps of Engineers. (2010). *Responding to National Water Resources Challenges: Building Strong Collaborative Relationships for a Sustainable Water Resources Future*. National Report. Washington, DC. http://www.building-collaboration-for-water.org.

Global Water Partnership. (2003). *Effective Water Governance: Learning from the Dialogues*. Status report prepared for the 3rd World Water Forum in Kyoto, Japan, March 16-23, 2003.

United Nations. (1992). *The Dublin Statement on Water and Sustainable Development*. http://www.un-documents.net/h2o-dub.htm.

3 Some recent texts that examine variations in water governance models include:

Norman, E. S., Cook, C., and Cohen, A. (2015). *Negotiating Water Governance: Why the Politics of Scale Matter*. Ashgate Publishing Ltd.

Harris, L. M., Goldin, J.A., and Sneddon, C. (2015). *Contemporary Water Governance in the Global South: Scarcity, Marketization and Participation*. Routledge.

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4 Harris et al. (2015). *Contemporary Water Governance in the Global South*.

5 See the FAO Corporate Document Repository, "World Water Resources by Country": http://www.fao.org/docrep/005/y4473e/y4473e08.htm.

6 Budds, J., and Hinojosa, L. (2012). Restructuring and rescaling water governance in mining contexts: The co-production of waterscapes in Peru. *Water Alternatives*, 5(1), 119.

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8 Blackman et al. (2012). *Voluntary Environmental Agreements in Developing Countries*.

9 Translated from Decree 1076 of 2015.

10 MacDonnell and Grigg (2007). Establishing a water law framework.

11 Budds,and Hinojosa (2012). Restructuring and rescaling water governance in mining contexts.

12 Budds and Hinojosa (2012). Restructuring and rescaling water governance in mining contexts.

13 See the World Water Forum Synthesis Report for an explanation of the Forum's outcomes. http://worldwaterforum7.org/outcome/file/Synthesis%20Report_7th%20World%20Water%20Forum.%20Fin.pdf.

14 Lempert, R.J., Popper, S.W., and Bankes, S.C. (2003). *Shaping the Next One Hundred Years: New Methods for Quantitative, Long-term Policy Analysis*. RAND Corporation, Santa Monica, CA, US. http://www.rand.org/pubs/monograph_reports/MR1626.html.

15 Pahl-Wostl, C., Sendzimir, J., Jeffrey, P., Aerts, J., Berkamp, G., and Cross, K. (2007). Managing change toward adaptive water management through social learning. *Ecology and Society* 12(2), Art. 30. http://www.ecologyandsociety.org/vol12/iss2/art30/.

16 See http://www.weap21.org.

17 Escobar, M. and Purkey, D. (2016). *Ríos Del Páramo Al Valle, Por Urbes Y Campiñas: Building Climate Adaptation Capacity in Water Resources Planning*. Final project report for the U.S. Agency for International Development. Stockholm Environment Institute, Davis, CA, US. https://www.sei-international.org/publications?pid=2917.

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