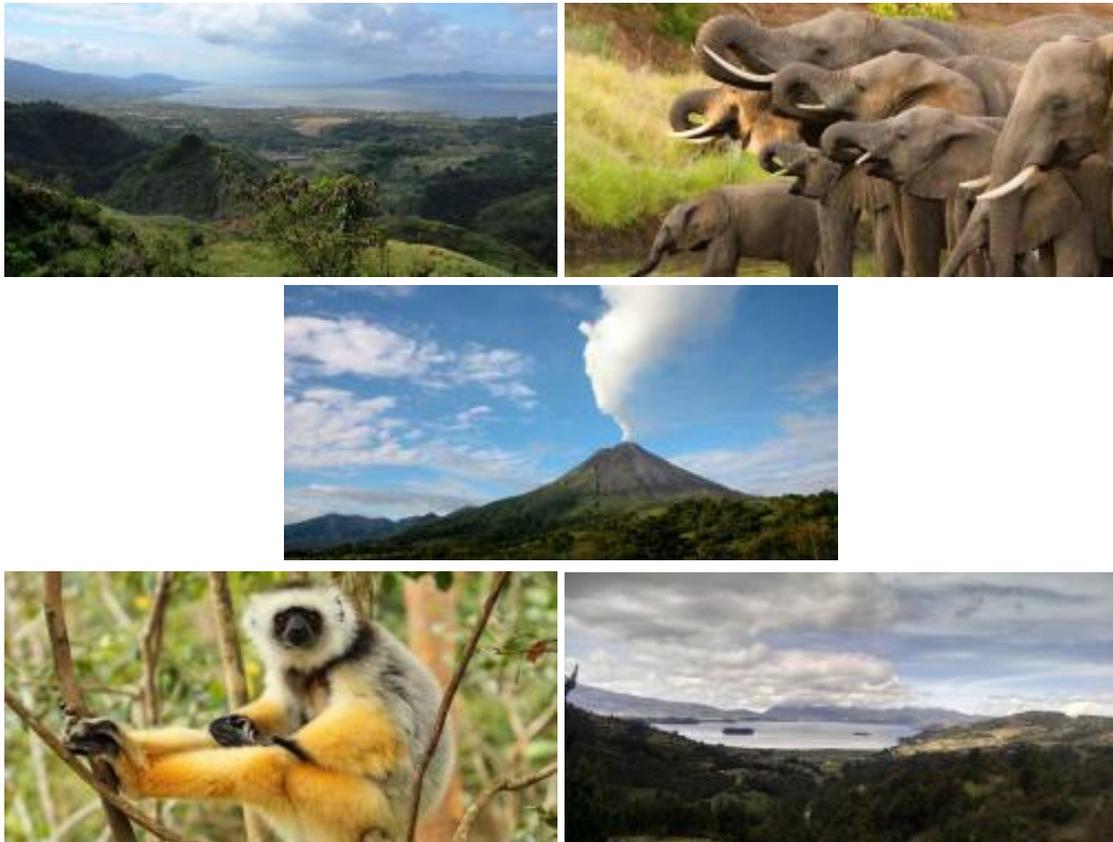


ACHIEVEMENTS AND LESSONS FROM THE WAVES FIRST 5 CORE IMPLEMENTING COUNTRIES

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August 2016



About WAVES

Wealth Accounting and the Valuation of Ecosystem Services (WAVES) is a global partnership that aims to mainstream natural capital in development planning and national economic accounts in support of sustainable development.

WAVES core implementing countries include developing countries—Botswana, Colombia, Costa Rica, Guatemala, Indonesia, Madagascar, the Philippines and Rwanda—all working to establish natural capital accounts. WAVES also partners with UN agencies—UNEP, UNDP, and the UN Statistical Commission—that are helping to implement natural capital accounting.

WAVES is funded by a multi-donor trust fund and is overseen by a steering committee. WAVES is grateful to its donors—Denmark, the European Commission, France, Germany, Japan, The Netherlands, Norway, Switzerland, and the United Kingdom.

Citing this report

Vardon, M., Lange, G-M., and Johansson, S. 2016. Achievements and Lessons from the First 5 Core Implementing Countries. World Bank WAVES, Washington, D.C., 78 p.

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List of Acronyms

BCCR – Central Bank (Costa Rica);
BT – Botswana Tourism
CGR – Comptroller General of the Republic (Colombia)
DGS – Department of Geological Survey (Botswana), now renamed Botswana Geoscience Institute
DANE – National Administrative Department of Statistics (Colombia);
DENR – Department of Environment and Natural Resources (Philippines)
DoE – Department of Energy (Botswana)
DNP – National Planning Department (Colombia);
DWA - Department of Water Affairs (Botswana)
ENRAP – Environmental and Natural Resources Accounting (Philippines)
IDEAM – Institute of Hydrology, Meteorology and Environmental Studies (Colombia)
INEC – National Institute for Statistics and Census (Costa Rica)
LLDA – Laguna Lake Development Authority (Philippines)
MADS – Ministry of the Environment and Sustainable Development (Colombia)
MFPD - Ministry of Finance Planning and Development (Botswana)
MH – Ministry of Finance (Costa Rica);
MIDEPLAN – Ministry of Planning (Costa Rica);
MINAE – Ministry of Environment and Energy (Costa Rica);
NCA – Natural Capital Accounting
NDP – National Development Plan
NEDA – National Economic Development Authority (Philippines)
NSCB – National Statistical Coordination Board (Philippines)
PCSD – Palawan Council for Sustainable Development (Philippines)
PSA – Philippines Statistical Authority
SEEA – System of Environment-Economic Accounting
SDG – Sustainable Development Goals
SDGI – Sustainable Development Goal Indicators
SNA – System of National Accounts
TWG - technical working group
US – United States of America
USAID – United States Agency for International Development
WAVES – Wealth Accounting and Valuation of Ecosystem Services

Preface

This report critically examines the work of the WAVES Partnership in the first five core implementing countries and distils the key lesson and achievements. It was undertaken in recognition of the growing interest in natural capital accounting by governments, the private sector and non-government organisations, and the need to better support work in current WAVES countries as well as in additional countries.

The report was developed over a 10-month period, beginning in October 2015 with a self-assessment questionnaire, followed by missions to countries conducted between November 2015 and April 2016 as well as follow-up discussions. Drafts of the country assessments were shared with stakeholders in May 2016 and updated based on the comments received. A preliminary report was presented at the Annual Partnership Meeting in June 2016 and comments were invited. The near final text of the report was completed in August 2016, with minor editing and formatting done subsequently.

As WAVES is the first program of its type, providing multiple countries with high levels of support over an extended period, the report is also the first of its type. We are very grateful to the many organisations and people that freely shared their experiences, both positive and negative, in the development and use of natural capital accounting. This enabled common barriers and factors of success to be identified, which greatly assists both the future work of WAVES as well as any country or organisation wanting to develop and implement natural capital accounting.

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1. Summary

1.1 Introduction

The Wealth Accounting and the Evaluation of Ecosystems Services (WAVES) Partnership program is unique in promoting the global implementation of Natural Capital Accounting (NCA) because it sought to institutionalize NCA in a group of countries through a program of extensive, long-term technical support in a partnership setting. Key features of the approach were the long-term involvement in each country and an emphasis on constructing accounts for defined issues and policy analysis. Botswana, Colombia, Costa Rica, Madagascar, and the Philippines were the First 5 Core Implementing Countries (or “First 5”) to join the WAVES program. Each country’s NCA program was tailored to contribute to the identified priorities, but also contributed to the demonstration component of the WAVES Partnership, in which the First 5 countries would learn from each other and inspire other countries to take up NCA.

The achievements, challenges, and lessons from the First 5 provide an opportunity to promote NCA around the world. They also enable the WAVES Partnership to examine the support provided to the First 5 and to identify where it can be strengthened.

The achievements and lessons were compiled between October 2015 and May 2016 using four methods: (1) a self-assessment questionnaire; (2) a technical review of the accounts produced or in production; (3) a country mission; and (4) follow-up questions and discussion. The information that follows is a summary covering key achievements, challenges, and lessons for the way forward. A future path is not yet finalized because countries are still completing their roadmaps. Following the summary, separate reports provide more details for each country.

WAVES criteria for NCA success

Progress toward the WAVES aim of institutionalizing NCA in countries and around the world was assessed against three broad criteria:

1. Production of accounts institutionalized as demonstrated by:
 - a) Publically available accounts, and
 - b) Relevant government agencies staffed and resourced to produce accounts on a regular basis.
2. NCA used in national policy dialogue to inform decision-making, as demonstrated by:
 - a) Inclusion in one or more of the following national strategic documents: national development plan, sector strategy or master plans, climate change strategies, legislation, or executive orders;
 - b) The use of key indicators derived from NCA to monitor and assess economic progress; and
 - c) Where country capacity exists, the use of NCA in environmental-economic tools for more extensive policy analysis.

3. The existence of a clear vision for NCA in the country and an understanding of how this can be achieved, as shown by the country's roadmap.

Despite great variation among the First 5 in terms of level of development, size, and statistical capacity (Table 1.1), all countries have made significant progress and have lessons for other countries going forward with NCA. The summary begins with an assessment of institutionalization and country ownership, the overall objective of WAVES. We then take a closer look at success in compiling the accounts themselves and using them for policy analysis. All countries have greatly increased their capacity to build NCA, and a review of WAVES' substantial efforts toward capacity building provides important lessons for future work. Communications has also been a critical component of the work to institutionalize NCA. Finally, we draw together lessons for the way forward and in particular for WAVES+, the next phase of WAVES.

Table 1.1. Country Context

Country	Gross national income per capita, 2014 (US\$)	Income level classification	Population (millions)	Area (million km)	History of NCA
Botswana	7240	Upper middle income	2.2	0.581	Yes
Colombia	7970	Upper middle income	47.8	1.141	Yes
Costa Rica	10120	Upper middle income	4.8	0.051	No ^a
Madagascar	440	Low income	23.6	0.587	No ^a
Philippines	3500	Lower middle income	99.1	0.300	Yes

Sources: Figures from World Development Indicators (WDI) and World Bank country profiles.

a. Small pilot studies only.

1.2 Institutionalization and Country Ownership

Strong country ownership is needed for institutionalization of account production and use. The importance of NCA has been recognized at a high political level in all countries, and all countries successfully established high-level, interagency national steering committees to provide strategic guidance as well as technical working groups (TWGs) to produce the accounts. The national steering committees were all chaired by a ministry of finance or ministry of planning and development, or an equivalent, with the aims of guiding the development of the accounts, ensuring coordination across ministries, and integration of NCA into policy and broader economic considerations. In all of the countries except Madagascar, the committees were composed entirely of government officials. In Madagascar, a representative from the mining industry was involved.

The performance of the national steering committees in meeting the aims varied among countries. Better performance was associated with regular meetings of the committees, ongoing engagement of high-level officials, and stable political environments. With infrequent committee meetings, as in Madagascar, progress on account production was generally slow. The delegation of meeting attendance to lower-level officials, as occurred in Colombia, meant that when, for example, intuitional questions concerning data access or clearance of publications arose, the committee was not able to quickly resolve some issues.

A clear issue in all countries was that, after the initial identification of policies and the accounts needed to support them, the task was directed to account producers. Little was done to prepare the potential users of the information for the arrival of the accounts, and there was no process to examine the specific policy options or tools available that support decision making and how the accounts could inform decision making or policy development. In several cases, while particular decisions or policies that could be supported by accounts were identified (for example, water pricing in Colombia and minerals pricing in the Philippines and Madagascar), the accounts were not (or may not be) ready in time, so the opportunity was lost (or may be lost).

Changing political circumstances are inevitable. Some countries experienced wide fluctuations in the level and type of political support. The challenge is to ensure that the accounts, processes, and capacity are built up when political support is there, so that they can be maintained when it is not.

At the technical level, interagency technical working groups (TWGs) were established to assist with constructing NCA and for coordinating inputs from different agencies. A variety of approaches were used to develop accounts. In many cases, the initial work on accounts was allocated to existing work units within organizations and in some these evolved into specific work units.

By the end of the program, all countries had units for NCA with staff assigned within government agencies. The agencies in which these units were located varied across:

- Line ministries (for example, for water, energy, and minerals in Botswana);
- Management agencies (for example, the management authorities of Lake Laguna and Palawan in the Philippines, and Chinchina and Lake Tota in Colombia); and
- Central agencies (for example, the Central Bank in Costa Rica, the Philippines Statistical Agency, and the Ministry of Planning and Development in Madagascar).

The location of the units and composition of the TWGs influenced the focus of the accounts and level of integration within the national accounts and other economic data. In all countries, more effort was devoted to physical accounts than monetary accounts, and hence scientists were more involved than economists. Integration with national accounts data occurred in Botswana and

Costa Rica and, via the mineral accounts, is underway in the Philippines. In Costa Rica, the location of the unit within the same organization that produced the national accounts meant that the same expertise, data, and processes used for the national accounts were available to those producing the NCA.

In most countries, the established units are still in the early stages, with some staff having multiple responsibilities beyond account production or use. This will need good management, monitoring, and support to ensure that they function as planned. Sustaining support has often focused on high-level government officials and the technical staff who actually carry out the work. Equally important, but often overlooked, is support at the managerial level, for example, directors assigning tasks on a day-to-day basis, ensuring that work is progressing according to the production schedule (and, where necessary, fitting account production into a broader statistical production program) and addressing issues such as interagency cooperation and data sharing obstacles.

In general, countries took one of two paths in the production of accounts. In some cases, accounts were constructed with a regular production process in mind. This was clearly the case in Botswana, where water accounts have been produced for three consecutive years and data sources and systems for the ongoing production of accounts beyond WAVES are in place. Alternatively, accounts have been produced as a one-off exercise, more along the lines of a research project. This was the case in the Philippines and Colombia with their ecosystem accounts (which is understandable given the experimental nature of this work).

Countries have to balance the need to produce accounts as fast as possible, which generally involves a research-based approach, with the need to establish and maintain ongoing account production processes. This requires a long-term commitment to building capacity and the systems needed to produce the accounts regularly.

Long-term roadmaps for NCA (beyond WAVES) are being drafted in each country, but have been developed late in the process, and the first drafts available for review in general lacked the detail necessary for a convincing business case for investment by governments or the international community.

The roadmaps will need to be further developed to provide a clear vision and identify the specific activities and milestones that each country will carry forward. This way, the specific inputs that WAVES+ or other investors might provide, either through direct country support or through the regional communities of practice, can be identified along with the strength of government commitment of (for example, their own financial and human resources).

All countries began work on roadmaps in later 2015 or early 2016, and none had updated their vision since the beginning of WAVES programs. There was little, if any, attention given to a vision and milestones beyond WAVES. Going forward, the country NCA vision should be reviewed regularly (possible annually) and include progress assessments. Considering the vision only at the beginning and

end of the program does not sufficiently allow for changing policy focus and practical learning from experience.

Key lessons from NCA institutionalization

National steering committees should be high level, meet regularly, and play greater roles in:

- Monitoring the progress of account production and ensuring that the resources available and production timetable best match the needs of policy development, as well as the need for ongoing production;
- Establishing administrative arrangements for data sharing among agencies and the processes for clearing publications;
- Ensuring that account users, government decision makers, and the analysts and advisors that support them are primed to receive the accounts;
- Extending the vision of NCA beyond the time frame of WAVES involvement—in new countries, identifying milestones for the vision early in implementation and updating the vision regularly will provide countries the chance to modify aims and implementation activities based on experience and shifting priorities; and
- Identifying and managing political risks and opportunities.

Countries need to establish a process for the ongoing mapping of information needs of different agencies to accounts and the policy and analytical tools used to support decision making. While all countries successfully linked issues with accounts in the early stages on the program, overtime the links were lost. A policy linking process needs to be established in parallel with the account production process.

The establishment of special technical working groups for NCA was a feature of the work in all countries. Going forward, using countries' existing mechanisms for coordination and information exchange should be explored more fully.

A final key lesson is that the time required for building country ownership and institutionalization of account production and use takes time, and that this time has been underestimated. Institutional set-up took to one to three years in most countries, delaying the technical work, training, and production of accounts. Late delivery of accounts and lack of interim products, discussed further in the next section, can provide a challenge for ownership as well as limiting the time available to apply the accounts to specific issues.

1.3 Building the Accounts

The original work plans of the First 5 included NCA for timber, water and minerals, following the System of Environmental and Economic Accounting (SEEA) Central Framework. Experimental accounts for ecosystem services were also developed by Colombia and The Philippines as well as being explored by Botswana and Costa Rica. Progress in constructing accounts is summarized in

Table 1.2, and additional information is in the country assessments found later in this document (Sections 2 to 6).

Table 1.2 Summary of natural capital accounting production in the First 5

	Botswana	Colombia	Costa Rica	Madagascar	Philippines
SEEA Central Framework					
Land			Published June 2016	In preparation	Methods paper
Forest		Published November 2015	Published June 2016		Scoping of mangroves in progress
Water	Three water accounts published	Published November 2015	Published June 2016	In review	
Energy	In preparation		Published June 2016		
Minerals	In review, expected mid 2016			In preparation	Draft of 4 minerals in review
SEEA Experimental ecosystem accounts (and tourism satellite accounts)					
Regional		Lake Tota published; Chinchina expected mid 2016; Orinoquia in preparation			Accounts for Southern Palawan and Lake Laguna basin expected mid 2016
			In preparation, expected end of 2016		
National	Scoping study for tourism in progress				

NCA is a complex area, requiring a multidisciplinary approach and the cooperation of many government agencies to produce and use accounts. To varying degrees, these agencies are cooperating and working together through TWGs on the production of accounts. While most of the data are directly collected by or accessed by line ministries, the role of the statistical office is key for the link to national accounts. In all countries, the statistical office has been a member of the steering committees and TWGs, but in some cases, the link to statistical officers and national accounts producers needs to be strengthened (for example, Botswana and Madagascar).

In general, countries have underestimated the challenges in carrying out NCA, and, in hindsight, the technical programs set by national steering committees had overly ambitious goals. This is not surprising, since while there is great momentum for NCA, there has been little experience with NCA globally and specifically in low and middle-income countries, where the experiences of the high-income countries that have pioneered this work are not fully relevant. In general, the high-level political commitment was not always matched by the resources and the management and monitoring needed to fulfill the original goals were absent. In most, but not all, cases the management processes were not used to modify the goals to a more realistic level.

The experiences of the high-income pioneers of NCA that rely on well-established information systems could not be replicated in countries lacking basic data on the environment and the economy. This was especially apparent in Madagascar. Simplified processes and systems for account production were adopted in some countries (for example, Botswana and Costa Rica) and is a suitable starting point for NCA. For ongoing production, the emphasis needs to be on an account production cycle and continuous improvement. Colombia had an existing system in the national statistical office, but this process was not replicated in the other account-producing agencies.

In some cases, countries recognized that the production of certain accounts was not feasible and accounts were deliberately removed from the work plan. This occurred in Botswana and The Philippines. In Botswana ecosystem accounts were investigated but the basic information needed on tourist arrivals to help estimate cultural and recreational ecosystem services—a key area of policy interest—were not available. Similarly, the Philippines identified a large suite of accounts but ultimately chose to proceed with only a limited number of them.

All countries encountered challenges in accessing data due to legal, administrative, or practical difficulties—for example, no time for staff to format data, data stored on personal hard drives (sometimes not backed-up), and inadequate data sharing among agencies. In some cases, data sharing is ad hoc and relies on informal arrangements among individuals, while in others it is authorized by an exchange of letters or a formal memorandum of understanding (MOU). A key lesson going forward is for countries to recognize the fundamental importance of data access to account production and to establish suitable arrangements for data access in the account construction phase.

Account production and data management systems are not fully in place in all countries. For example, national business registers are lacking (such as in Madagascar) or deficient, and account producers have had to manually code data (for example, on energy or water use) to industry from customer lists (as in Botswana). Going forward, opportunities to coordinate and improve basic data infrastructure, including business registers and other administrative data sources, would lead to greater efficiencies (and hence a potential reduction in costs) in public sector data collection and distribution activities.

A key lesson learned is that the design of account production processes needs to focus more on the current availability of data and a recognition that the accounts will be a patchwork of information from a range of different and imperfect data sources. In this, the accounts initial aim is to use the existing data to demonstrate feasibility and usefulness then to improve the quality of accounts over time. Striving for perfection first time has contributed greatly to delays in producing accounts.

Even when draft accounts were constructed, it often took a long time to release accounts for review, and even longer to obtain all the necessary approvals and clearances to publish the accounts (e.g. make them available on the Internet). At present, only a few accounts are publically available (notwithstanding the range of communication available, and a number are scheduled to be published in the near future). Because NCA was new in countries and involved a range of agencies for account production, there was no preexisting clearance process that could be used and the issue was not anticipated sufficiently. This is generally not a problem in high-income NCA producers that take data quality assessment and clearance processes for granted.

All countries other than Botswana have only one iteration of accounts and have not developed new production schedules for the accounts that include a data quality assessment process. Botswana has produced accounts multiple times, has established clearance processes, and data quality assessment is formally recognized in the process. However, most countries have developed a data quality assessment process for the System of National Accounts (SNA) that could be used as a model going forward.

Data quality is often an issue because the data needed for accounts are typically scattered across many agencies and, when compiled, often bring to light data discrepancies (that is, data from different sources show different results), data gaps, and data quality deficiencies. Definitions of particular terms or data items are also an issue, along with different levels of resolution in remotely sensed data (for example, 30 square meter grids compared to 250 square meters). Countries have reacted in different ways when such issues have emerged. Under the best circumstances, with effective cooperation among agencies, as in the case of Botswana with the mineral and national accounts, the response to data discrepancies was positive and the information was used to improve the quality of data.

The documents and reports produced by countries varied greatly in format and content. While the SEEA framework was used to construct the accounts, the formatting of the accounting tables and the nature of the reports that were published varied greatly across countries. Some just published tables, without any commentary, some published indicators and tables with extensive technical background papers and short descriptive commentary, while others included more detailed analyses and policy recommendations. A consistent approach to formatting tables and presenting and documenting the accounts facilitates building a policy relevant time series of accounts for the country, as well as for cross-country comparisons.

Key lessons from building accounts

Accounts have been produced in a variety of institutional settings, with no one arrangement being more or less able to produce accounts. In all cases, account production relies on a variety of skills and knowledge, and the key is to find the right blend of technical (physical science, economics, accounting) and management expertise. In general, middle management needs to be strengthened in countries, and a focus on the production process should help. Data quality assessment and clearance processes need to be factored into account production early in the implementation phase. A range of international experience in this area exists, particularly for national accounting, that could be applied to NCA (as Botswana has shown).

Key barriers to account construction are data access and data sharing. While there are some technical aspects (for example, data format and file size), the main issues are not technical but administrative or legal in nature. As such, these issues need to be addressed by senior managers or high-level officials and, if necessary, brought to the attention of the national steering committee. Without resolution of this critical issue, technical progress on account production will be slow.

In countries with limited primary data, account production will be problematic. Information from international sources (particularly satellite data on land cover and the models linking these to ecosystem services) may be used as starting point. Commissioning primary data collection can also be used but is generally expensive. A checklist of “NCA readiness” should be developed for countries wishing to implement NCA and preparation should be recognized a distinct phase (this type of framing may have helped Madagascar more effectively). In some cases, this will need to involve improvement to national information (such as tourism statistics and the business register in Botswana, and national accounts in Madagascar).

A greater focus is needed on accounting outputs. This includes the accounts themselves, as well as indicators, commentary, and the description of data sources and methods. The SEEA table format is complex and, in most cases, has been successfully simplified. Publications with more extensive commentary have generally taken longer to clear and the practice of national accountants in low- and middle-income countries, as well as accounts in high-income countries, is to publish accounts with limited commentary. More guidance is needed on accounting outputs, including templates for tables and publication structures and on separating accounts from interpretation and analysis.

1.4 Policy Focus

The countries identified policy entry points and timelines for NCA and designed their original work plans around these opportunities. The entry points were a mixture of general issues (for example, deforestation, land use planning) and specific decisions (for example, mineral and water pricing). In several cases, additional issues and accounts were identified, which was an indication that the agencies involved and the steering and technical committees of countries were able to identify additional policy entry points. However, over time, the links of

the accounts to issues or questions were subsumed by technical work. In all countries, insufficient attention was given to maintaining the links to policy and ensuring that the accounts produced would serve the identified needs. In this situation, the delay in producing accounts was a critical issue, and key potential uses (for example, water price setting by in Colombia) and users had no choice but to use other information.

A key achievement in all countries is that NCA has been explicitly included in the national development plans or similar strategic documents, albeit often in a conceptual or aspirational manner. However, for myriad reasons, more complex applications to specific decisions or policy uses of the accounts identified in work plans have yet to occur.

In large part, this lack of application is the result of the complex task of building NCA in a manner that simultaneously builds capacity within government while facilitating long-term institutionalization. This is a much slower process than simply hiring a consultant to produce accounts, which was the usual approach of previous programs and did not result in ongoing production and use of accounts. Institutional set-up took to one to three years, and drafts of accounts for most countries were not available until the fourth year of the program, greatly limiting opportunities for their application to policy.

In many cases, communications materials were used to present potential or actual policy applications of accounts but the full accounts were not available publically for reference. The situation of forcing communications experts or account producers into the role of accounts analysts and interpreters for decision makers is not ideal, but reflects the lack of expertise in the area within countries as well as internationally. It also reflects the dearth of international examples to draw on. Some examples are available from developed countries and point to potential ways to overcome this barrier, but more work is needed in this area.

Over the course of the WAVES implementation, three types of account uses or potential uses have emerged:

1. ***NCA-derived policy indicators that can be readily carried out without specialized expertise:*** Policy indicators can significantly improve evidence-based dialogue and decision making within government, between government and civil society, the private sector, and others. Indicators derived from NCA can include, for example, trends in natural resource use and supply (national and sectorial, reliance on imports), simple productivity indicators at national or industry level, and industry-level environmental-economic profiles. Such indicators have been produced for water and forest accounts in Botswana, Costa Rica and Colombia, as well as macroeconomic indicators adjusted to more fully take into account changes in natural capital (Botswana and Madagascar).
2. ***Using NCA as part of broader analytical work or in land management and land-use planning:*** This includes examination of the resource rent

recovered by government from mineral extraction (Botswana, Madagascar, and the Philippines), water pricing (Botswana, Colombia, and Costa Rica), and timber royalties (Colombia). The land management aspect is demonstrated by the uptake of the accounts by subnational management agencies in Colombia and the Philippines.

3. **Policy analysis:** Examination of specific issues based on integrating NCA into complex economic tools like input-output (I-O) and computable general equilibrium (CGE) modeling, which require specialized expertise and tools. Using accounts in such work is being investigated in Colombia.

In addition to these policy uses, the accounts or accounting paradigm have entered into the political dialogue. For example, in 2016 in Colombia, the forest accounts were used with other information to estimate the economic impact of forest fires.

1.5 Capacity Building

In all countries, the capacity to produce the accounts has increased substantially, and most expect to produce at least some of the accounts on their own, supported by an annual review of updated accounts by international experts. Ecosystem accounts are both more complex and newer—at present there is no internationally agreed on methodology. As such, if this component is to continue, it will require ongoing engagement with national and international experts. WAVES placed great emphasis on long-term, intensive, hands-on capacity building and professional development as the keys to country ownership and institutionalization.

In terms of starting points, some countries had greater prior experience with NCA than others. For example, Botswana and The Philippines had significant experience dating back to the 1990s, while Colombia had a program running at the national statistics office parallel to WAVES. Madagascar and Costa Rica were relatively new to NCA, although both countries had small, one-off pilot studies in the 1990s (but no long-term engagement).

The importance of the United Nations Statistical Commission's 2012 adoption of the SEEA Central Framework as an international statistical standard cannot be understated. Countries can now be confident that what they are learning is part of an approved and internationally recognized methodology. However, because this is a new field with relatively few international experts, the technical capacity to assist countries, particularly in languages other than English, was (and remains) limited and needs to be expanded.

There are few formal training courses, and these cover introductory or intermediate material, generally consisting of five-day courses focused on theory, rather than practical guidance. Furthermore, there are few international experts available to provide more advanced training and advice. In contrast, the training on SNA is extensive. For example, there is a six-week International Monetary Fund (IMF) course available on the SNA as well as a large pool of international experts available for in-country training and advice.

SEEA training material is available online, such as the World Bank Knowledge Platform and introductory training from the United Nations. But training needs to be complemented by on-the-job professional development dealing with a country's specific data issues. Successful capacity-building models included local consultants who provided day-to-day technical support, with occasional support and review from international consultants, or international consultants who were available on long-term assignment to provide a combination of in-country and long-distance technical support. These successful experiences demonstrate the need to identify more in-country experts and long-term consultants who can build capacity in countries in the short term, and in the mid-term examine options for using local educational institutions.

1.6 Communications

Active communications programs in each country and extensive stakeholder consultations have been critical to build broad understanding of and support for NCA throughout government, civil society, academic institutions, and, to a lesser degree, in the private sector. While successful communication has built understanding, it also raised expectations that have been challenging to meet.

Communications programs were based on hiring and training local communications experts by the International Institute for Environment and Development (IIED) in close cooperation with the WAVES Secretariat communications team. Annual retreats for all countries' communications staff to share experiences were held during the WAVES Annual Partnership Meetings. A large number of communication products were developed and events were held for a wide range of stakeholders, from high-level government officials to local communities. As a result, the importance of NCA for sustainable development has been recognized at high political levels in all countries.

Some countries integrated communications staff into the program at the beginning; in others, a communications team was put in place at a later time and had to catch up. Greater success was achieved when there was close interaction between communications professionals and those who produce and use the accounts. For example, in the Philippines, the program benefited from regular stakeholder meetings—from identifying policy questions at the beginning to teasing out messages from preliminary accounts. In Colombia, outreach to the media and officials in the Planning Ministry helped in raising the profile of NCA.

In the absence of in-depth and systematic policy analysis, communicators helped bridge the gap by bringing out policy briefs and a short snapshot version of the accounts, which helped build understanding of the work in country, as well as globally. The communications specialists were able to link to the global Web site and knowledge center, and help disseminate in-country work.

1.7 The Way Forward

There are many lessons, large and small, to be gained from the experiences of the First 5 WAVES countries over the past four to five years. Some things have gone well in most countries, with key lessons learned emerging. The greatest lessons are that:

- The connection to policy and decision-making must be improved;
- Account production needs to be accelerated and build on existing data and processes; and
- Stronger links are needed to the SNA.

The development and use of NCA was seen as a sequence, starting with the identification of priority issues, mapping these to the appropriate accounts, setting up the institutional arrangement for NCA, development of the accounts, and application of accounts back to the policy issues. The initial identification of issues and the mapping of these issues to accounts were successfully completed in all countries. However, setting up the institutional arrangements took much longer than expected, account production was slow, and therefore the loop back to the issues was not completed.

What was missing in all countries was a detailed understanding of the policy and analytical tools that were available to decision makers and a continual linking of the accounts to the analytical and policy communities. In particular, account production needed to consider the timeliness of information—that is, the information needed to be available when policy or planning processes required the information, or when particular decisions were being made. Several opportunities were identified for informing specific decisions, but in many instances accounts were not ready in time for use in these decisions. In this situation, it was apparent that the dimensions of data quality most important to account producers were accuracy and coherence (adherence to standards), while decision makers were more interested in timeliness and interpretability.

What is needed:

1. Better initial identification of policy entry points—who is making decisions, when are they making decisions, and where are decision makers obtaining advice (identification of issues is not enough).
2. An early and ongoing process of engagement with the analytical and policy communities.
3. A greater focus on account production as an on-going process taking advantage of existing information and data coordination mechanisms—this includes management of the production process and analysis to ensure information is timely for use of NCA.
4. Stronger links to national accounting.

The first can be added to countries initial start-up work, and the second requires establishment of a parallel process for connecting policy to accounts, as well as a better articulation of how accounts can be used by the policy and analytical communities. A key part of this is intensifying work on presenting the results from accounts in an easy-to-understand, accessible manner. This also requires building understanding of NCA and disseminating the results to civil society, the media, and a wider audience to ensure a broader constituency for NCA and hence increase the chances of accounts being used to inform decision making.

The third and fourth points on production and linking to national accounting have been covered in the work to date. Going forward, the priority should be on ensuring middle managers can sufficiently understand the technical work to effectively monitor progress, make the necessary links to the national accounting, physical science, analytical and policy communities.

More detail on the lessons and way forward is provided in section 7 as well as in the country assessments of the First 5 that follow in section 2.

2. BOTSWANA ASSESSMENT

2.1 Background

This report is based on a variety of inputs including:

- The response to the WAVES Country Assessment Questionnaire returned in November 2015;
- An assessment mission conducted February 16–18, 2016;
- An examination of the accounts produced or in production; and
- Follow-up questions and discussions with those involved in the production and use of environmental accounts in Botswana.

Botswana has:

- A population of 2.2 million;
- An area of 581,000 km²;
- A gross national income per capita of US\$7,240 (upper-middle income);
- A stable national government;
- An intermittent history with a pilot environmental accounting program (1998–2002); and
- A trust funds disbursed at March 31, 2016 US\$1.171 million.

Botswana is a land-locked, mineral-rich, and dry country in southern Africa. Natural resources—a combination of minerals, energy, land, and ecosystems—account for one-third of the country’s total wealth and underpin many important contributions that drive the economy, such as nature-based tourism, mining, and agricultural activities. NCA was adopted by the government to optimize the use of natural resources and determine how they can be used to diversify the economy and reduce poverty.

Botswana has a long history of economic planning for development and is currently formulating its 11th plan, which incorporates NCA as a tool to inform its strategies on climate change adaptation, poverty eradication, and the Sustainable Development Goals (SDGs). Botswana has been dependent on minerals for development, and the diversification of its economy by sustainably using its natural capital is a key goal.

2.2 Account Production and Data

Botswana joined WAVES in August 2011 and has produced accounts for water and minerals, while energy and macroeconomic indicators are in production and tourism satellite accounts are being explored (Table 2.1). A major achievement in Botswana has been the production of water accounts for three consecutive years, which clearly indicates the ability to move from piloting to institutionalization and regular production of accounts.

Table 2.1. Summary of NCA Production in Botswana

Account	Production status	Agency responsible	Notes
Water			
- <i>Physical SUT</i>	Three completed	DWA	Reference years are 2012–13, 2013–14, and 2014–15.
- <i>Physical Asset</i>	In preparation	DWA	Expected end of 2016
- <i>Monetary SUT</i>	Three completed (partial information)	DWA	Combined presentation of physical and monetary use at purchasers' prices. Reference years are 2012–13, 2013–14, and 2014–15.
Energy			
- <i>Physical SUT</i>	In preparation (partial information)	DoE	Draft time series for coal and electricity prepared for 2010–11 to 2014–15.
- <i>Monetary SUT</i>	In preparation (partial information)	DoE	
Minerals			
- <i>Physical Asset</i>	Near publishing	Econsult Botswana for DGS ^a	Preliminary scoping report in 2013; final draft awaiting publication.
- <i>Monetary Asset</i>	Near publishing	Econsult Botswana for DGS ^a	Preliminary scoping report in 2013; final draft awaiting publication.
Macro-indicators	Preliminary balance sheet completed	MFDP	First draft of a national balance sheet (part of total wealth) was prepared as part of the mineral accounts (above), but not separately published as part of total wealth.
Ecosystems	Investigated but postponed		Scoping study complete but decided not to proceed until tourism data become available
Tourism	Scoping study in preparation for a tourism satellite account	BT	Consultant employed and work has begun

Notes: DWA = Department of Water Affairs; DoE = Department of Energy; DGS = Department of Geological Survey; MFDP = Ministry of Finance and Development Planning; BT = Botswana Tourism.

a. The DGS is currently being reorganized and renamed.

Water accounts

The water accounts prepared were assessed against the data quality assessment framework and the results are shown in Table 2.2. The physical supply and use tables of the water accounts have been prepared for three consecutive years, along with partial monetary use tables. In addition, a time series of physical water use dating back to 1990 is provided in the latest publication.

The quality of the accounts improved with each iteration for most aspects of data quality, and the ratings for most assessment criteria are high (Table 2.2). Accuracy (the closeness of the estimates in the accounts to the true values) is moderate, but is improving. For example, the estimates of agricultural and mining water use were improved between the second and third edition of the accounts by the inclusion of additional data collected by the team from both industries as well as increased understanding of the water abstraction by an integrated coal mine and power plant. A feature of the latest water account is that it contains a data quality statement as well as information on the conceptual framework (that is, SEEA), data sources, and methods.

Table 2.2 Data Quality Assessment of the Water Accounts

Dimension of data quality	Rating	Comments
Relevance	High	The accounts are directly related to issues of national importance, particularly to water scarcity and food security.
Accuracy	Moderate	A range of primary and secondary data sources has been used to generate the estimates included in the accounts. A local and international review process was used and the results tested through consultation with key data providers and the TWG. A data quality assessment framework was used and is included in the latest account.
Timeliness	High	The most recent data are for the reference year 2014–15.
Accessibility	High	Accounts are available on the Internet.
Interpretability	High	The accounts include a number of figures, and maps and indicators complement the tables and text. A time series is available for water supply. Information on the data sources and methods as well as a data quality assessment are presented.
Coherence	High	SNA and SEEA concepts and recording conventions have been used. Table format is closely aligned with SEEA.

Standard data collection and management procedures have been established and maintained. Data collection templates have been developed for the mining and electricity industries and irrigating farms. Currently, the water accounting team manually codes the main water supplier’s customer database, but methods for automating this task or having the water supplier perform the coding prior to submission to the Department of Water Affairs are being investigated. The Water Technical Working Group cleared the water accounts for publication.

Going forward, increasing the quality of the existing accounts, and especially improving agricultural estimates, expanding to full monetary supply and use tables, and completion of asset accounts will provide a more accurate and complete picture of water resources and their use in Botswana, which should enable a greater range of policy applications.

Minerals

Mineral accounts have been prepared and are awaiting publication. An advanced draft (May 16, 2015) has been reviewed against the data quality assessment

framework (table 2.3). Preliminary mineral accounts were produced in 2013 by a consultant in a session with the government and the Mineral Technical Working Group. The account is expected to be published in mid-2016. In addition to the account, a methodological guide was prepared along with a report on mineral revenues.

The mineral accounts cover major mineral and energy resources, including diamonds, copper, nickel, gold, soda ash, and coal. Accounts provide physical and monetary estimates of stocks and flows.

Table 2.3. Data Quality Assessment of the Mineral Accounts

Dimension of data quality	Rating	Comments
Relevance	High	The accounts are directly related to issues of national importance, particularly in assessing the level of revenue received by the government from mining and the expected lifespan of mineral reserves.
Accuracy	Moderate	A range of primary and secondary data sources has been used to generate the estimates included in the accounts. A local and international review process was used. Assumptions and data limitations are noted in the report, but an assessment of data accuracy was not included.
Timeliness	High	The accounts included in the report are for a range of time periods. The most recent data are for the reference year 2014.
Accessibility	Low	Will be high once the accounts are published and available on the Internet
Interpretability	High	The accounts include summary tables and figures, and key information for each mineral and energy resource is easy to identify. Key concepts and methods are explained. Full accounts are included as annexes. Data sources and methods and the limitations of these are provided.
Coherence	High	SNA and SEEA concepts and recording conventions have been used. Table format is closely aligned with SEEA.

The work on mineral accounts identified data discrepancies between data sources. A process to reconcile the discrepancies is underway and Statistics Botswana is assessing the information with a view to improving the estimates for the mining industry in the national accounts.

Energy

Partial energy accounts (electricity and coal) are in an advanced state of production. A draft publication, dated March 2, 2016, was available for review and assessed against the data quality assessment framework (Table 2.4).

Table 2.4. Data Quality Assessment of the Energy Accounts

Dimension of data quality	Rating	Comments
Relevance	High	The accounts are directly related to issues of national importance, particularly in energy self-sufficiency and assessing the demand for energy and its importance to the economy of Botswana. Interruptions to electricity supply have focused policy attention on the electricity supply industry.
Accuracy	Moderate	Data were obtained from the major producers of coal and electricity from annual reports and other sources as well as secondary sources such as the national accounts. No assessment of accuracy is provided in the draft report
Timeliness	Moderate	The most recent data are for the reference year 2014–15
Accessibility	Low	Will be high once the accounts are published and are available on the Internet
Interpretability	High	The draft accounts include an executive summary as well as summary figures. Key findings and major trends are identified, and main concepts and methods are explained.
Coherence	High	SNA and SEEA concepts and recording conventions have been used. Table format is closely aligned with SEEA.

At present no publication date has been set for the energy accounts. The draft accounts were considered by the Technical Working Group in April 2016, and their comments are being incorporated. The completion of the accounts was expected earlier, but has been delayed due to capacity constraints.

Macroeconomic indicators

The production of macroeconomic indicators for Botswana has been delayed. Draft macroeconomic indicators, including a national balance sheet, adjusted net savings, and adjusted net income were completed in September 2015. The review progress has been slow and that the report on indicators is yet to be finalized. The Ministry of Finance and Development Planning's designated team conducted training in February through May 2016 to develop the capacity to produce the macroeconomic indicators in the long term.

Ecosystem and tourism accounts

In planning for WAVES implementation, accounts for tourism and the ecosystems of Chobe, Makgadikgadi, and Okavango were identified. A scoping study on ecosystem accounting was completed in 2014, but a decision was made not to proceed with account production. Production was halted because the data and expertise needed to produce the accounts was not readily available and resources would have to be diverted from other accounts (water, energy, and minerals).

Tourism satellite accounts were prioritized in November 2015. Key missing data included information on tourism arrivals needed for estimating the cultural and

recreational ecosystem services based on natural capital, which was the main policy interest. Steps were taken to ensure that tourist arrival information was processed and a scoping study on tourism satellite accounts commenced in March 2016.

Data

In Botswana, information is held by a variety of agencies in a variety of formats. Data management practices are basic and can be improved. Data are generally stored in Excel spreadsheets and not in specialized database software (for example, Access), of which there is little knowledge or experience. Some information stored on personal hard drives has been lost or had to be recovered from people who have left government employment. In addition, data collected from surveys has not been processed in a timely manner. For example, there has been a long delay (two to three years) in the entry of the arrival and departure cards that contain some of the information necessary for tourism satellite accounts and the estimation of cultural and recreation services in ecosystem accounts. To compound the delay, the tourism database was not functioning for an extended period and only became usable in March 2016.

The update of the business register in Statistics Botswana has taken some time. This has meant that the water and energy accounts have had to rely on customer lists provided from water and energy suppliers through informal arrangements. The experience with the customer lists used in the water and energy accounts should be able to inform the update of the business register, which demonstrates the contribution of WAVES in streamlining some of these data systems.

2.3 Communication and Information Sharing

A range of communication and information-sharing activities has taken place. A communications and engagement strategy aimed at building awareness of WAVES work in Botswana has been developed. Other highlights include:

- On February 10, 2015, a high-level Sensitization Breakfast Meeting on Wealth Accounting was held with over 90 attendees, including senior officials from the government, government-owned enterprises (or “parastatals”), the private sector, nongovernmental organizations (NGOs), and members of the TWGs.
- In March 2015, the updated water accounts were presented at the Water Pitso, a large annual meeting of all stakeholders in the water sector.
- In August 2015, a WAVES informational stall was included at Botswana’s Annual Consumer Fair.
- In November 2015, the WAVES Project Steering Committee and stakeholders discussed the draft NCA Roadmap beyond WAVES, which lays out the vision, mission, and objectives for long-term NCA activities during the NDP 11 period (2017–22). The roadmap intends to strengthen the application of NCA for water, minerals, energy and ecosystems (including land and tourism), while bolstering capacity for compiling and using accounts within government planning, budgeting, and reporting

systems. These activities will be prioritized and costed annually within the scope of normal government planning cycles.

- Between April 29 and May 3, 2016, the WAVES team in Botswana hosted a visiting WAVES delegation from Rwanda to share best practices.
- A representative from WAVES Botswana participated in various knowledge-sharing platforms in Scotland (November 2015), Kenya (March 2016), South Africa (March 2016), and Rwanda (May and October 2015).
- Two conference papers based on Botswana's water accounts were presented at the WaterNet Symposium in Mauritius held October 28–30, 2015: "Institutionalization of Water Accounts in Botswana: Can This Enhance Management of Available Water Sources?" and "Economic Accounting of Water: The Botswana Experience."
- By mid-2016, the MFDP Web site is expected to include a link to the WAVES Web site.

A country brief and three policy briefs have been prepared. Two policy briefs, on water and minerals, were prepared as part of the WAVES Policy Brief Series. In addition, the Department of Water Affairs and the Centre of African Research prepared a policy brief on irrigation and water resources locally. Within Botswana, WAVES has been covered positively in the electronic media; for example, on Botswana television (BtV) shows in February 2015, and on two local radio stations in May and August 2015. WAVES was also featured in a newspaper article in November 2015.

Significantly, NCA and WAVES have been included in high-level political statements, such as mentions by His Excellency the President during his State of the Nation addresses in 2014 and 2015.

2.4 Governance and Project Management

The leadership of WAVES in Botswana was in the Ministry of Finance and Development Planning (MFDP), which has the mandate to coordinate economic policies and development planning, and therefore was the appropriate institution to take the lead.

The Deputy Permanent Secretary of the Ministry of Finance and Development Planning chaired the WAVES Steering Committee. This is the lowest level at which decisions can be taken in a steering committee without referring back to the ministry for decisions. The steering committee included membership (at Deputy Permanent Secretary level) of other key agencies, namely:

- Ministry of Minerals, Energy, and Water Resources
- Ministry of Environment, Wildlife, and Tourism
- Ministry of Infrastructure, Science, and Technology
- Ministry of Agriculture
- Statistics Botswana
- Botswana Tourism Organization

Because the steering committee had high-level representation, it could make decisions about budget and work plans and publish reports. The committee uses terms of reference consistent with the WAVES toolkit.

In addition to the steering committee, five TWGs were established. These were for: water, minerals, macroeconomic indicators, ecosystems and energy.

2.5 Capacity Building

A mixture of local and international consultants provided support for account production. Consultants were involved in training as well as with assisting in account preparation. Technical assistance included the following:

- **Mineral accounting:**
 - 2013–16, Econsult Botswana (Keith Jefferis)
- **Energy accounting:**
 - March 2014, February 2015, United Kingdom (Rocky Harris)
 - July 2014, September 2015, and February 2016, Statistics Netherlands (Rutger Hoekstra)
- **Water accounting:**
 - 2013–February 2016, Centre of Applied Research (Jaap Arntzen and Tshepo Setlhogile)
 - February 2014, Australian Bureau of Statistics (Steve May)
 - July 2015, October 2015, and February 2016, Australian National University (Michael Vardon)
- **Macroeconomic indicators:**
 - February 2015, Econsult Botswana (Keith Jefferis)
 - Was with the minerals accounts
- **Ecosystem accounting:**
 - July 2013, Wageningen University (Lars Hein)
- **Tourism accounts:**
 - March–June 2016, Acorn Consulting, United Kingdom

2.6 Institutionalization

Concrete steps have been taken to institutionalize the production of NCA in Botswana. These include:

- The establishment and maintenance of two thematic TWGs (water and minerals).
- Building on the work in existing TWGs for macro indicators and tourism.
- A TWG for land and ecosystems was set up, but did not continue.
- Establishing an NCA unit at the MFDP.
- Establishing a water accounting unit at the DWA with four to five staff (not all full time).
- A budget for an energy accounting unit in the MFDP has been allocated.
- Mineral accounts have been added to the work program of an existing unit within the Botswana Geoscience Institute, formerly the Department of Geological Surveys.

- A training program has been started for national education and professional development in the field of environmental accounting. An MOU between the MFDP and the University of Botswana Department of Economics and Environment Sciences is in review. This requires considerable work to operationalize, but if implemented could contribute significantly to the development of national and regional capacity in the production and use of NCA.

The technical work has also identified improvements and harmonization, for example, in coding data, which may increase efficiency in producing accounts. Introducing industry coding to the billing systems of the main water and energy suppliers would significantly accelerate the production of the water and energy accounts. This experience could also assist with the construction and maintenance of business registers used by Statistics Botswana for a range of information, including national accounts.

In addition, WAVES has improved communication among different institutions involved in data, statistics, and accounting. The increased interaction and exchange among institutions engaged in data generation should enable more efficient collection and use of data.

A draft roadmap for NCA beyond WAVES has been prepared. It includes a clear vision for ongoing account production, including governance, institutionalization and capacity building, as well as expanding the accounts to include tourism based on ecosystems. Use of the accounts is covered, particularly their potential role in forecasting of mineral revenues. The final roadmap could put greater emphasis on linking to uses of accounts.

2.7 Account Applications

NCA in Botswana has been used symbolically, conceptually, and instrumentally.

The symbolic use has been in regular statements from Botswana President Ian Khama. For example, the last three State of the Nation addresses (2013–15) have highlighted the importance of NCA to Botswana’s economic development and aim of sustainable development.¹ The inclusion of NCA in 11th National Development Plan (NDP 11) is also symbolic.

NDP 11 is also a conceptual use of the accounts and points to some potentially important uses for monitoring (for example, SDGs) and the management of natural resources, particularly minerals and water. Two actual and one potential use of the mineral accounts were found: the first actual use was in the identification of discrepancies between different data sources. These are being investigated and are likely to lead to improvements in the data used to construct the national economic accounts. The second actual use is in contributing to the development of a new fiscal rule for mineral revenues. The potential use of the

¹ See <https://www.wavespartnership.org/en/botswana-president-highlights-waves-state-nation-address>.

mineral accounts is a proposed new data analysis and forecasting unit in the Department of Mines.

The potential use of water accounts for policy and decision making has been recognized (water pricing, investment in water supply infrastructure, alternative water sources), including links beyond the water sector. For example, more connections could be made to agriculture and food security.

The potential use of energy accounts has also been recognized. There are discussions with the University of Botswana on using the accounts in energy modeling. Within government, there are plans to use the accounts in the Renewable Energy Strategy.

2.8 Conclusions

Botswana has political commitment at the highest level and the country recognizes natural capital as a priority for development. This is demonstrated by strong statements from the president and its prominence in the evolution of the NDP 11. This commitment is also confirmed by Botswana's strong leadership role in the region on sustainability and NCA, including contributing to the global agenda (for example, Rio+20) and the Gaborone Declaration on Sustainability in Africa. Through its draft roadmap, Botswana has a vision for how NCA can be sustained beyond the first phase of WAVES.

Accounts have been produced for water and minerals, while macroeconomic indicators and energy accounts are in production. The water and mineral accounts are rated highly by the data quality assessment framework used in this evaluation. Ecosystem accounts were originally planned, but due to current capacity and data limitations a deliberate decision was made not to proceed with them. This was a sound management decision, clearly showing an appreciation of the issues and the need to focus on realistic targets for account production.

Significant progress has been made on the institutionalization of account production. In particular, the water accounts have been produced three times. Within the WAVES first five core implementing countries, Botswana is the only country to have published an account more than once. In addition, data management systems and production methods have been developed for water, energy, and mineral accounts.

Local capacity to produce accounts in government is increasing and currently at a moderate level. Botswana is fortunate that outside of government, in the private sector, there is additional local capacity in private enterprise and in the University of Botswana.

A significant achievement of the work on accounts was to bring together the data-producing agencies and the identification of data gaps and deficiencies in the Botswana information system.

In terms of policy use, while the potential of NCA is clearly recognized by government and is demonstrated by the significant steps taken to include NCA in

the NDP 11, the use of the account for decision-making and policy planning has been limited to date.

The capacity within government to use the accounts in, for example, analyses to support government decision-making is limited. There is, however, capacity for this outside of government in the private sector and could be developed elsewhere (for example, the University of Botswana).

Botswana is very close to being able to integrate and institutionalize NCA, but these goals require strong leadership and a concerted effort to manage and monitor the processes established beyond the WAVES program. The challenge is to develop and maintain capacity and to institutionalize the links to policy, particularly for national-level economic planning.

2.9 The Way Forward for WAVES in Botswana

Although final decisions are yet to be made with respect to providing support to the current core implementing countries, it is possible that WAVES+ could include a low intensity country program in Botswana. The finalization of the country roadmap by Botswana should provide the vision and priorities for NCA in country.

WAVES+ could include things such policy applications of the existing accounts and streamlining account production processes. Targeted technical assistance may be considered, particularly for linking accounts to government policy and decision-making.

The regional component of WAVES+ will likely build on the existing WAVES partner countries and is designed to provide support to regional capacity building, south-south learning, and networking, from which Botswana will be able to benefit.

3. Colombia Assessment

3.1 Background

This report is based on a variety of inputs including:

- The response to the WAVES Country Assessment Questionnaire returned in November 2015;
- An assessment mission conducted December 15–17, 2015;
- An examination of the accounts and other material produced or in production;
- Follow-up questions and discussions with those involved in the production and use of environmental accounts in Colombia; and
- The 2015 WAVES Colombia Country Report.

Colombia has:

- A population of 47.8 million;
- An area of 1.1 million km²;
- A gross national income per capita of US\$7,970 (upper-middle income);
- A stable national government; and
- A long but intermittent history of environmental accounting program, beginning in 1992.
- Trust funds disbursed at March 31, 2016 US\$1.194 million

Colombia is a geographically diverse country in the northwest corner of South America. The country is dominated by the Andes, which rise to 5,000 meters, but also has coastal plains adjacent to the Pacific Ocean in the west and the Caribbean Sea in the north, as well as the Amazon Rainforest in the east. Climatically the country is generally divided into four zones: tierra caliente (hot lands below 1,000 meters); tierra templada (temperate land between 1,000 and 2,000 meters); tierra fria (cold land between 2,000 and 4,000 meters); and tierra helada (permanent ice and snow). Around 10 percent of the Earth's species occur in Colombia, the second most species in the world (the first is Brazil, which is seven times larger)².

Colombia recently emerged from a period of civil turmoil, with the government embarking on formal peace negotiations in 2012. Rural development will look to transform conditions in the countryside, reducing poverty through plans and programs, increasing opportunities and institutional support (Colombia, Office of High Commissioner for Peace, 2014).

3.2 Account Production and Data

Colombia joined WAVES in 2011. As part of the WAVES program, Colombia has produced accounts for two regions, a national water account as well as forest

² Humbolt Institute, <http://www.humboldt.org.co/es/biodiversidad/que-es-la-biodiversidad>.

and land accounts (Table 3.1), while the national statistics institute, DANE, has separately produced a range of accounts (Table 3.2). The accounts produced as part of the WAVES Partnership were assessed against the data quality assessment framework and are discussed briefly under separate headings below. In general, the tables in the accounts are mostly in a form consistent with the SEEA, but the publications containing the tables are in a variety of formats.

Table 3.1. Summary of Natural Capital Account Production in Colombia by WAVES

Account	Production status	Agency responsible	Notes
Water			
- <i>Physical SUT</i>	Completed	WAVES Partners	Published in tables and on Internet in November 2015.
- <i>Physical Asset</i>	Completed	WAVES Partners	Published in tables and on Internet in November 2015
- <i>Physical water emission</i>	Completed	WAVES Partners	Published in tables and on Internet in November 2015
- <i>Monetary SUT (partial)</i>	In review	WAVES Partners	Draft report completed and in review. Expected publication in 2 nd semester 2016
Forests and timber			
- <i>Physical Asset (land cover and timber)</i>	Completed	WAVES Partners	Published on Internet November 2015
Lake Tota			
- <i>Physical Asset (water)</i>	Completed	WAVES Partners	Published on Internet May 2016
- <i>Physical SUT (water)</i>	Completed	WAVES Partners	Published on Internet May 2016
- <i>Monetary SUT (partial)</i>	Completed	WAVES Partners	Published on Internet May 2016
Chinchina			
- <i>Physical Asset (water)</i>	Near complete	WAVES Partners	Final report awaiting publication on Web site
- <i>Physical SUT (water)</i>	Near complete	WAVES Partners	Final report awaiting publication on Web
- <i>Physical Asset (land cover)</i>	Near complete	WAVES Partners	Final report awaiting publication on Web site
- <i>Physical Supply (ecosystem services)</i>	Near complete	WAVES Partners	Final report awaiting publication on Web site
Orinoquia			
- <i>Physical Asset (land cover)</i>	In review	WAVES Partners	Final draft report in review
- <i>Physical supply (ecosystem services)</i>	In progress	WAVES Partners	Tables and final draft report in construction; expected end of 2016
- <i>Monetary (partial)</i>	In progress	WAVES Partners	Tables and final draft report in construction (fisheries and tourism), expected end of 2016

Notes: WAVES Partner agencies = DNP, IDEAM, DANE, MADS, CGR. CGR = Comptroller General of the Republic; DANE = National Administrative Department of Statistics; DNP = National Planning Department; IDEAM = Institute of Hydrology, Meteorology and Environmental Studies; MADS = Ministry of the Environment and Sustainable Development.

Table 3.2. Summary of Natural Capital Account Production in Colombia by DANE (non-WAVES)

Account	Production status	Agency responsible	Notes
Timber and other forest products			
- Physical SUT (timber and forest products)	Completed	DANE	Published in a report November 2015
- Monetary SUT (timber and forest products)	Completed	DANE	Published in a report November 2015
Mineral assets	Completed	DANE	Published August 28, 2015
Energy			
- Assets	Completed	DANE	Published August 28, 2015
- Physical SUT	Completed	DANE	
Emissions			
- Physical SUT	Completed	DANE	Published August 28, 2015
Expenditure on environmental activities	Completed	DANE	Published October 28, 2015
Waste account (experimental)	Completed	DANE	Published November 27, 2015

Water accounts

The water accounts published under the WAVES program included physical asset and supply and use tables as well water emissions (for example, the pollution discharged into water). These accounts were assessed against the data quality assessment framework (Table 3.3).

There were some data quality issues with the coherence of the accounts as they were originally published. In particular, the physical supply and uses do not fully balance (with wastewater appearing to have been incorrectly recorded) and the total abstraction recorded in the supply and use table did not equal the abstraction by the economy in the physical asset account. Once identified the information was corrected, but as yet has not been republished. Estimates of agricultural water use are an area where there was disagreement over the accuracy of the estimates because there are multiple information sources. A final draft of the monetary supply and use tables has been prepared, but has yet to be released.

The issue with data coherence and the delay in the release of monetary information are an indication of the difficulties in working across multiple institutions. It is also perhaps a reflection on the different data quality assessment and publication release processes in the various organizations, and even of emphasis on different dimensions of data quality. The finding of inconsistencies in the published accounts underscores the need for an agreed on revisions process.

The prepared report is generally of high quality, with lots of graphics and tables consistent with the SEEA format, which greatly aid interpretation. The diagrams of flows are particularly useful. In some cases, the reference year could be added to the title of graphics rather than having it included in the footnote (for example, figures 8–12). Going forward, the priority should be on increasing the quality the existing accounts, and especially improving the coherence of the tables, accuracy of estimates, and production timeliness. Such improvements should enable a greater range of policy applications.

Table 3.3. Data Quality Assessment of the National Water Accounts

Dimension of data quality	Rating	Comments
Relevance	High	The accounts are directly related to issues of national importance, particularly for security of water supply in the face of climate change and water pricing.
Accuracy	Moderate	The accounts have relied on a range of directly collected and modeled data. A concern over the estimates of agricultural water use was evident with collaborators unable to determine the best estimate based on multiple sources of data.
Timeliness	Moderate	The data related to 2012 and the report with the accounts was not available until 2015.
Accessibility	Moderate-High	A report with the accounts is available on a publically accessible Web site. Monetary accounts are yet to be made public.
Interpretability	High	Graphics, summary indicators, and information on data sources and methods are included in the publication.
Coherence	Moderate	SEEA concepts and recording conventions have been used. Inconsistencies in the original publication were evident and were corrected (but the Website publication has not been updated)

Forest accounts

National forest accounts were prepared, and, as part of this, national timber, land cover, and land-use accounts were also prepared. The accounts were assessed against the data quality assessment framework (Table 3.4)

Table 3.4 Data Quality Assessment of the National Forest Accounts

Dimension of data quality	Rating	Comments
Relevance	High	The accounts are directly related to the nationally recognized issues of deforestation and climate change.
Accuracy	Moderate	The accounts have relied on a range of directly collected and modeled data.
Timeliness	Moderate	The data cover 1990–2012 and the report with the accounts was not available until 2015.
Accessibility	High	The report is available on a publically accessible Web site.
Interpretability	High	Graphics, summary indicators, and information on data sources and methods are included in the publication
Coherence	Moderate	SEEA concepts and recording conventions have been used. Inconsistencies in the publication were evident and were corrected

Lake Tota

A suite of accounts has been prepared for Lake Tota. These were available for review, but and were recently made publically available. The account includes tables of water assets, physical supply and use of water, and expenditure on wastewater treatment. Some summary information based on the preliminary accounts was included in the WAVES 2015 Colombia country report. A feature of this work is the suite of integrated accounts, which enables the levels of water abstraction to be compared against the available water supply and the condition of the water to be related to expenditure on wastewater treatment. A final draft of the monetary supply and use tables has been prepared. Results were presented to local actors and published on the Corpoboyaca Web site (Regional Environmental Authority) in May 2016.

A data quality assessment was applied to the draft accounts made available as part of the review process and updated to reflect publication on the web (Table 3.5).

Table 3.5 Data Quality Assessment of the Lake Tota Accounts

Dimension of data quality	Rating	Comments
Relevance	High	The accounts are directly related to the management needs of the area and have been welcomed by the local management authority.
Accuracy	Moderate	The accounts have relied on a range of directly collected and modeled data.
Timeliness	Moderate	The data related to 2012 and preliminary data were not available until 2015.
Accessibility	High	The accounts were published on a Web site. Summary information is also available. ^a
Interpretability	High	Graphics and summary indicators have been prepared. ^a
Coherence	High	SEEA concepts and recording conventions have been used.

a. See the WAVES 2015 Colombia Country Report.

Chinchina

Regional level accounts were prepared for the Chinchina River watershed. Initial drafts of water, forest, and timber accounts exist, but are not yet publically available.

A data quality assessment has been applied to the draft accounts made available as part of the review process (Table 3.6). A key feature of the report is that it goes beyond accounts and forecasts water availability based on predicted changes to forest cover.

Table 3.6. Data Quality Assessment of the Chinchina Accounts

Dimension of data quality	Rating	Comments
Relevance	High	The accounts are directly related to the management needs of the area and have been welcomed by the local management authority, CORPOCALDAS.
Accuracy	Moderate	The accounts have relied on a range of directly collected and modeled data.
Timeliness	Low-moderate	The data are related to years spanning 2001 to 2012. While a draft report has been prepared, it is not clear when it will be finalized and released.
Accessibility	Low	The accounts are not generally available.
Interpretability	High	Some graphics and summary indicators have been prepared and are included in the draft publication. Extensive methodological documentation is available.
Coherence	Moderate	SEEA concepts have been used. However, the format of many of the tables in the report appears not fully consistent with SEEA.

Orinoquia, ecosystem account

A short scoping paper has been produced containing an assessment of the information needed and available to estimate the ecosystem services from the region. An initial version of the conceptual and methodological framework of ecosystem accounting adapted to Colombia has been shared with the Technical Committee of WAVES Colombia. Draft reports of land, carbon, and forest accounts as well as for tourism and fisheries are expected by the end of May 2016.

Suarez, land and timber accounts

A case study of Suarez was initially planned by the Steering Committee and preliminary investigations conducted. However, institutional arrangements with the regional environmental authority (CAR) were not able to be made because of scheduling issues. As such, the Steering Committee decided not to continue with the study.

Data

Data in Colombia are held by a large number of agencies at national and subnational levels, as well as in the private and NGO sectors. The recently launched (December 2015) environment information platform, the National Environmental System in Colombia (SINA), should help with the identification of and access to environmental data.

A particular issue for NCA in Colombia is the data needed from the national accounts. In the national accounts, the data related to the agriculture, forestry, and fishing industries are aggregated (combined together). Similarly, the water supply, sewerage, and energy industries are also combined. The disaggregation of these industries would greatly enhance the usefulness of both the national capital accounts and the national accounts for analysis and policy making.

For the purposes of producing regional natural capital accounts, it would also be useful to be able to estimate the main national accounting aggregates (for example, output, gross value added) by region as well as for specific industries (and in particular agriculture, forestry, water supply, and sewerage).

3.3 Communication and Information Sharing

Colombia has undertaken a range of communication and information sharing activity. In November 2015, the WAVES Colombia Steering Committee formally endorsed a communication and engagement strategy. All relevant ministries have agreed to provide NCA information on their Web sites and to find opportunities for promotion.

A range of other communication activities has occurred. Starting in September 2015, a monthly digital newsletter was prepared and sent to WAVES stakeholders, including government institutions, NGOs, research institutes, and academics. The number of direct recipients is currently more than 100. For the mass media, two articles on NCA were published in December 2015. The first appeared in the mainstream national *Portafolio*, which is typically read by 75,000 people daily in its print form and online by approximately 1.5 million people. The second article was published in *El Espectador*, a newspaper with 227,500 print readers, and many more online.

WAVES has also used social media, having an account for Latin America shared between Colombia, Guatemala and Costa Rica; its number of Facebook and Twitter followers continues to grow.

The WAVES Colombia team also engaged with new stakeholders, including the Colombian Environmental Research Institutes (Humboldt, IIAP, SINCHI); the National University of Colombia; the Andes University; the International Finance Corporation arm of the World Bank Group; the United Nations Educational, Scientific and Cultural Organization (UNESCO); the U.S. Geological Survey; the World Wildlife Fund; GIZ; TEEB; and the Institute for Sustainability Leadership of Cambridge University.

In March 2016, Colombia hosted a regional workshop attended by WAVES communicators and technical experts on how to communicate results from NCA to policy makers.

3.4 Governance and Project Management

The leadership of WAVES in Colombia is in the Department of National Planning (DNP). This department has the mandate to coordinate economic policies and development planning and therefore is the appropriate institution to take on this role.

The chair of the WAVES Steering Committee was a vice-minister. After the initial meeting, this was delegated to the Subdirector of Sustainable Environmental Development of the DNP. The committee's membership consisted of the following agencies:

- National Planning Department (DNP);
- Ministry of the Environment and Sustainable Development (MADS);
- National Administrative Department of Statistics (DANE);
- Institute of Hydrology, Meteorology and Environmental Studies (IDEAM); and
- Comptroller General of the Republic (CGR) as an observer of the process.

Due to delegation to more junior staff in most organizations (with exception of IDEAM and DNP), there were difficulties with project planning, ongoing monitoring, and, in particular, with technical clearance of publications authored by multi-agencies. The Steering Committee met at least quarterly, with at times monthly meetings (one of the reasons for the delegations to more junior staff). The committee has not adopted formal MOUs (for example, like those suggested in the WAVES toolkit); several versions were developed and at least one was agreed on by the Steering Committee, but due to internal processes with offices at the interior of each institution, no agreement has been reached on a final version.

In addition, three TWGs were established—for water, land and forest, and ecosystems. There were technical experts and there was a high degree of overlap between the memberships of the TWGs (water, land and forests, and ecosystems).

The members of the TWGs and the Steering Committee were all government employees.

3.6 Capacity Building

Capacity has built through a variety of formal training, on ground technical assistance and exposure to NCA concepts and uses at a variety of seminars and meetings. Table 3.7 presents a summary of the training, meetings, and seminars.

Table 3.7 Participation in Regional and Global Training

Global WAVES Partnership meetings	Washington, DC, June 2013, 2014, and 2015
International Conference in SEEA	New York, EEUU, June 17–19, 2013
Natural Capital Accounting: A Decision-Making and Public Policy and Development Tool	January 9, 2014
Global Workshop on Forest Accounting	Washington, DC, May 11–13, 2014
“Use of Environmental Accounts in Colombia”	Bogotá, Colombia, September 15, 2014
Regional workshop of NCA for Latin America and the Caribbean with emphasis in water accounts	San José Costa Rica, December 17–19, 2014
First WAVES Workshop on Global Knowledge Exchange about Ecosystems and Its Valuation	Los Lagos, The Philippines, February 23–27, 2015
Expert Forum on SEEA Experimental Ecosystem Accounting	New York, April 28–30, 2015
Capacity-Building Workshop on Water Cycle—Community for Spatial and Hydrographical Information for Latin America and the Caribbean	Cartagena, Colombia, May 19–22, 2015
Ecosystem Accounting Workshop	Bogotá, Colombia, August 19–20, 2015
World Bank and NASA Workshop on Evapotranspiration Mapping for Water Security	September 16, 2015
UNESCO Workshop on Remote Sensing Use for the Evaluation of Water Use by Agriculture	November 25–27, 2015
USGS Workshop on Agro-Climatological Analysis Using Data in Raster Format and Tools FEWS NET	March 7–18, 2016
Latin American and the Caribbean Regional Workshop on Environmental Accounting for Policy Analysis	March 16–17, 2016
Regional LAC Communications Workshop	March 18–19, 2016
UNESCO Workshop “Estimating Water Consumption on a 30 m Grid for Irrigated Land in Colombia during 2012”	March 29–31, 2016

A mixture of local and international consultants provided on-ground assistance for account production. Consultants were usually involved in both training as well as with assisting in account preparation. Technical assistance was provided for: water accounting (Ricardo Martínez-Lagunes, Sofía Roa, Martha García, Consuelo Onofre, Claudia Tetay, Paula Uyttendaele, Alexandra Arévalo); land and forest accounting (Juan Pablo Castañeda, Luz Dary Yepes, Fabián Cote, Jeimmy Avendaño, David Bain); regional and ecosystem accounts (Lars Hein, Ricardo Martínez, Luz Dary Yepes, Stockholm Environment Institute, Sofia Roa, Claudia Rodríguez, Consuelo Onofre, Ken Bagstad, Maria Teresa Palacios, Hector Tavera, Giovanni Prieto). In addition, communication support was provided by Sonu Jain (WAVES Secretariat and IIED (Maria Elvira Talero). The WAVES Coordination Team in Colombia also provided assistance: Rita Cestti (Task Team Leader [TTL]); Juan Pablo Castañeda (co-TTL); Henry Alterio (National Coordinator); and Daniela Gutierrez (Assistant).

3.6 Institutionalization

Steps have been taken to institutionalize the production of NCA in Colombia. This includes the establishment of the National Steering Committee and Technical

Working Groups for water as well as land, forests and ecosystems, establishing the Environmental Accounts National Committee bases, included in the NDP 2014–18, “All for a New Country.”

The institutions involved in the production of the accounts have added natural capital accounts into work plans. DANE already had a unit working on NCA.

The technical work has identified opportunities for improvements and harmonization of data (for example, ensuring coherence between the data produced by DANE and IDEAM). Several efforts have helped identify methods to fill data gaps. For instance, the use of innovative techniques based on data from remote sensing for estimation of irrigation water consumption by agriculture.

A key issue to resolve going forward is the data quality assessment and clearance processes. There were long delays between the production of the first drafts of accounts and their publication. Going forward these processes need to be clearly identified and understood by account producers so that they can better meet the needs of data users.

3.7 Account Applications

Many of the accounts are not yet published or only recently published, so opportunities to apply them to policy or decision making have been limited. That said, there are some examples of use and several potential uses have been identified. Significantly, NCA in Colombia was included as a concept in NDP 2014–18: “All for a New Country.”

One of the benefits of having accounting information is that it is available for unexpected events. In Colombia, the forest accounts were used with other data to estimate the impact of the forest fires triggered by the El Niño phenomenon on the value of timber. High-level officials communicated the severity of the fire and its economic impacts with this information.

The peace process involved the production of the “Environmental Peace Dividends” study. This study used the land and forest accounts to indicate, for example, the economic loss due to deforestation in conflict municipalities.

A key practical outcome of the production of the accounts was improved communication among different institutions involved in data, statistics, and accounting. The increased interaction and exchange among institutions engaged in data generation should enable more effective collection and use of data.

A range of potential account applications was identified. These applications include:

- providing indicators for the SDGs;
- Organization for Economic Co-operation and Development (OECD) accession (specific proposal from DNP and DANE, for indicators);
- Green Growth Strategy (specific proposal from DNP, for indicators);
- the peace process (environmental peace dividends, as a benefit of environmental policies in actual conflict zones);
- management of public finances;

- identification of water regulation issues;
- water pollution and investment in water treatment infrastructure;
- water fee adjustment (going on with DNP and MADS; analysis of economic impacts of water fee changes); and
- timber exploitation fee adjustment (used by MADS to analyze differences between administrative registers of timber use coming from regional environmental authorities and the account at national level).

There are many potential uses of accounting by regional management authorities. This is already seen for the management of Lake Tota where the accounts provide indicators for CONPES (policy document) as well as in the management of Chinchina where the accounts have provided indicators for the Watershed Use and Management Plan (*Planes de Ordenamiento y Manejo de las Cuencas de Abastecimiento* or POMCA).

Applications of the national water account are also envisaged. This and the use by regional management authorities is explored further below.

Management of Lake Tota

Strengthening the knowledge of water demand by municipalities that are being supplied by Tota Lake's watershed is one of the strategies of the watershed policy tool. Water accounts show that the main users of the water from the watershed are water supply companies inside and outside the watershed, fisheries and agriculture (mainly spring onion crops). Hotels and households are secondary users.

Pollution of the lake by agricultural activities in the watershed, is a key issue and the water emissions accounts show this pollution is reducing. The information on the emissions complement and support the monitoring of actions and can assist in efforts to control the level of contamination in the watershed. Strategies aiming to increase wastewater management and promote sustainable economic activities include actions such as providing basic sanitation infrastructure (e.g. build a sewer network), financing wastewater treatment projects, and changing agricultural practices via technical assistance programs for livestock, fisheries, and agricultural guilds.

Results from the accounts were presented in May 2016 to stakeholders and feedback was positive. The Regional Environmental Authority (Corpoboyaca) considers the account useful for designing a payment for environmental services scheme (PSA). Based on the results in Lake Tota, there is also interest from the Department of Boyaca for the construction of the account in other watersheds (and the Department of Boyaca may co-fund their application).

Management of Chinchina

The water and land accounts as well as an assessment of ecosystem services in the Chinchiná River watershed can strengthen the action plans of local authorities for sustainable development. The accounts can monitor the state of natural capital in the watershed, its impacts in the economy, and the success of conservation programs.

National water account

The potential use of the national water accounts for policy and decision making has been recognized. In particular, the water accounts, when combined with other information, have indicated that a large percentage of water (approximately 70 percent) may not be effectively regulated and priced. This is under investigation.

It is also recognized that water accounts, and in particular full monetary supply and use tables, along with the value of water supply and wastewater treatment infrastructure, revenues from water supply and wastewater treatment, and the cost of operating these systems (from the national accounts) could be used for water pricing, decisions about investment in water supply infrastructure, and alternative water sources as well as wastewater treatment. The water accounts could also be used in further analysis, and modeling could be used to better understand the impacts of climate change and changes in water availability on agricultural production.

The potential instrumental use of the accounts by the comptroller general to monitor the efficiency of government expenditure and revenue collection was identified. This would require a great emphasis on the monetary accounts, and the environmental protection expenditure accounts in particular.

3.8 Conclusions

In Colombia, NCA is recognized politically at high levels as very important and necessary for sustainable development. The new NDP includes references to NCA in its Green Growth Strategy.

Several accounts have been completed or nearly completed. National natural capital accounts have been produced for water as well as for land and forest. In addition, regional-level accounts have been produced for two areas, and a third is in preparation.

Progress has been made on the institutionalization of account production. Both IDEAM and DANE understand why working closely together is important. Better operational mechanisms and formal agreements may assist in this. In particular, the clearance process needed for NCA products that use inputs from multiple sources were not properly identified and need to be refined (and a steering committee with higher-level representation would have helped). In this case, the dimensions of data quality of most interest to the data producers (for example, DANE and IDEAM), were accuracy and coherence, whereas the dimensions of interest to policy makers and for analysis were accessibility, relevance, timeliness, and interpretability.

There are emerging examples of the use of accounts and of an accounting approach to analyzing issues. The number of actual uses is still small, but most accounts have only recently been completed and several accounts are yet to be made available publically. Many potential uses have been identified and some are being actively pursued. A significant achievement was the use of accounts to bring together the data-producing agencies and to identify data gaps and

deficiencies in the Colombia information system (for example, problems with coherence identified for water, land, forests, and so forth).

Local capacity to produce accounts in government is increasing and capacity is currently at a moderate level. Locally, there is additional capacity to assist with account production outside of government in the private sector and in universities.

The capacity within government to use the accounts in, for example, analyses to support government decision making, is moderate. A key challenge is to develop the capacity to interpret and use the accounts in government decision making. Better linking of the accounts to policy options (for example, user pays, polluter pays) and analytical tools (such as CGE modeling) will address this challenge.

3.9 The Way Forward for WAVES in Colombia

Colombia has been able to produce a range of NCA at national and regional levels. Institutional arrangements have been developed and the aim now is to ensure the recurrent production and use of accounts. A key part of this is to reinvigorate the National Steering Committee to ensure it functions as an effective strategic body—championing the accounts, identifying opportunities, determining priorities and enabling production and use of accounts.

While no final decision has been made, WAVES+ in Colombia may be able to assist with:

- finalization of the Orinoquia ecosystem accounts;
- development of indicators and communication of messages to high-level officials;
- using accounts for input to the macroeconomic models currently in use and those to be developed in the future;
- working on the application of the accounts to particular issues, including green economy, OECD accession, post-conflict issues (especially in Orinoquia), use of the accounts by the comptroller and regional land management authorities, water, and timber pricing;
- designing and applying a process for linking NCA to policy and decision making;
- broadening engagement with the policy, analytical, and technical NCA communities (for example, via the London Group); and
- capacity building (mostly through the regional component) and possibly targeting development of “young NCA professionals.”

The finalization of the Colombia Roadmap will greatly aid discussions about possible support for Colombia in WAVES+.

4. Costa Rica Assessment

4.1 Background

This report is based on a variety of inputs including:

- The response to the WAVES Country Assessment Questionnaire returned in November 2015;
- An assessment conducted November 16-18, 2015;
- An examination of the accounts produced or in production;
- Follow-up questions and discussions with those involved in the production and use of environmental accounts in Costa Rica; and
- The 2015 WAVES Costa Rica Country Report.

Costa Rica has:

- A population of 4.8 million;
- An area of 51,000km²;
- A gross national income per capita of US\$7,970 (upper-middle income);
- A stable national government; and
- A long but intermittent history of environmental accounting program beginning in 1991.
- Trust funds disbursed at March 31, 2016 of US\$0.506 million

Costa Rica has followed a development path based on investment in human capital and the conservation of its abundant natural resources. The country ranks 62 among 187 countries in the Human Development Index (HDI), with a high level of human development. Natural capital of Costa Rica has a value of US\$9,473 per capita, close to gross domestic product (GDP) per habitant (World Bank 2011). The country has a history of innovative natural resource management and, for example, implemented a payment for ecosystem services (PES) scheme to conserve its forests and protect water reservoirs. The country also has a commitment to renewable energy and has a policy objective of decarbonization of the economy (Toward Carbon Neutrality) for 2021.

4.2 Account Production and Quality

Costa Rica joined WAVES in February 2012. As part of the WAVES program, Costa Rica has produced accounts for water, land cover and forests, as well as energy and carbon dioxide (CO₂) emissions. These were released at the WAVES Annual Partnership in June 2015 (Table 4.1). Ecosystem accounts are also being developed. These accounts were reviewed against a data quality assessment framework and are discussed briefly under separate headings below.

Table 4. 1. Summary of Natural Capital Account Production in Costa Rica

Account	Production status	Agency responsible	Notes
Water accounts			
- <i>Physical SUT</i>	Complete	BCCR (MINAE, MH, MIDIPLAN, INEC)	Published June 2016
- <i>Physical Asset</i>	Complete	BCCR (MINAE, MH, MIDIPLAN, INEC)	Published June 2016
- <i>Monetary SUT (partial)</i>	Near complete	BCCR (MINAE, MH, MIDIPLAN, INEC)	Published June 2016
Forest and land accounts			
- <i>Physical SUT (timber and forest products)</i>	Near complete	BCCR (MINAE, MH, MIDIPLAN, INEC)	Published June 2016
- <i>Monetary SUT (timber and forest products)</i>	Near complete	BCCR (MINAE, MH, MIDIPLAN, INEC)	Published June 2016
- <i>Physical Asset (land cover)</i>	Near complete	BCCR (MINAE, MH, MIDIPLAN, INEC)	Published June 2016
Energy accounts			
- <i>Physical SUT</i>	Near complete	BCCR	Published June 2016
- <i>Monetary SUT</i>	Near complete	BCCR	Published June 2016
CO₂ Emission accounts		BCCR	Published June 2016
Macro-indicators	In preparation	BCCR	Still in exploratory phase
Ecosystem accounts	In preparation	MINAE	Work in progress, publication expected late 2016

BCCR = Central Bank; INEC = National Institute for Statistics and Census; MIDEPLAN = Ministry of Planning; MH = Ministry of Finance; MINAE = Ministry of Environment and Energy;

Water accounts

The water accounts were assessed against standard measures of data quality (Table 4.2). The water accounts included tables of physical assets and supply and use. Some monetary data are also included in a combined presentation to enable the generation of indicators. A key feature of the accounts is the use of diagrams to explain the stocks and flows of water.

Table 4.2 Data Quality Assessment of the Water Accounts

Dimension of data quality	Rating	Comments
Relevance	High	Costa Rica has a large rainfall but it is not distributed evenly in time and space and water scarcity is evident at some places in some times. For example, in Guanacaste water demand is growing due to increasing tourism and this province also has the largest irrigation and hydroelectric projects in the country.
Accuracy	Moderate	No explicit statement about data accuracy is included in the account.
Timeliness	Moderate	Date are provided for a range of time periods. The water asset and supply accounts relate to 2012
Accessibility	High	Accounts are available on the Internet
Interpretability	High	An executive summary is provided. The accounts make good use of figures and the diagrams showing the flow of water to different industries and sectors are particularly useful. Information on data sources and methods. Some data are presented in time series and table 17 is useful for presenting this and also serves to highlight gaps. The accounts are aligned with the structure of the SEEA.
Coherence	High	The accounts are based on the application SEEA and SNA concepts.

Land and forest accounts

The land and forest accounts was examined and reviewed against the data quality assessment framework (Table 4.3).

Table 4.3 Data Quality Assessment of the Forest and Land Accounts

Dimension of data quality	Rating	Comments
Relevance	High	Forests cover 52% of the country. Economic activities dependent on forests include timber, food production, and tourism. Managing trade-offs between industries and maximizing benefits from forest are important public policy issues.
Accuracy	Moderate	No explicit statement about data accuracy is included in the account.
Timeliness	Moderate	The most recent data are for 2013.
Accessibility	High	Accounts are available on the Internet
Coherence	High	The accounts are based on the application of SEEA and SNA. The accounts were integrated with information from the national accounts.
Interpretability	Moderate (will be updated based on published accounts)	An executive summary is provided and the accounts use a variety of figures and text to aid interpretation of the tables. Information on data sources and methods and a time series spanning 1992 to 2013 are included so trends can be seen. The accounts relied on the SEEA for the concepts in draft accounts reviewed but standard accounting presentations were not used for tables

A variety of data sources were used in the production of the accounts. These included the National Forest Inventory and the national accounts. Data-sharing agreements are in place with the agencies supplying data for this accounts. Concordance tables between SEEA and national land cover classifications are provided.

An issue identified in the construction of the forest and land accounts was the aggregation in the national accounts of the forestry, fishing, and agricultural industries. To be more relevant to policy and to make it easier for producing natural capital accounts, the information on these industries in the national accounts needs to be disaggregated.

Energy and CO₂ emission accounts

The energy accounts were examined and reviewed against the data quality assessment framework (Table 4.4).

Table 4.4 Data Quality Assessment of the Energy and CO₂ Emission accounts

Dimension of data quality	Rating	Comments
Relevance	High	Energy and CO ₂ emission accounts provide information on relevance to climate change policy, particularly on reducing emissions from fossil fuels.
Accuracy	Moderate	No explicit statement about data accuracy is included in the account.
Timeliness	Moderate	The most recent data are for 2013.
Accessibility	High	Accounts are available on the Internet
Interpretability	Moderate	Indicators, figures, and text are provided to support the interpretation of the accounts. A three-year time series of accounts is provided indicating trends, while particular data items have a longer run (for example, energy intensity, 2000 to 2013). Limited information on data sources and methods was provided.

The energy accounts present national-level information on energy use. No supply table is provided, although information is provided on primary and secondary sources of energy. In this, the tables show the use of energy by industries according to different types of energy sources (for example, fossil fuels and electricity from renewable sources). The industry breakdown shown in the accounts is very detailed which enhances the usefulness of the information. Basic information on methods and data sources are described in the text (but in future editions could be expanded).

Ecosystem accounts

Work on SEEA-based ecosystem accounts in Costa Rica began in February 2016 and is expected to be complete by the end of 2016. Both ecosystem asset and ecosystem services accounts are being produced. The accounts will cover the years 1997, 2008, and 2013. The ecosystem services to be measured include carbon sequestration and storage, water regulation, and culture and recreational services. The ecosystem services used by agriculture (and especially by coffee

and pineapple) are also included. Ecosystem condition is being assessed in relation to soils and suitability for agriculture.

The starting point for the ecosystem accounts are the land cover maps, which are aligned with the land and forest accounts already prepared. The land cover account provides the information on ecosystem extent that is the basis for estimating the production of ecosystem services. Biodiversity accounts are planned for future versions of the accounts.

The ecosystem accounts are intended to inform analyses of the economic benefits of tourism and tradeoffs related to agriculture production and forest protection.

4.3 Communication and Information Sharing

A range of communication material has been produced for Costa Rica, including:

- WAVES country reports for 2014 and 2015;
- a country brief (2015); and
- two policy briefs, one for water and one for forest accounts.

Costa Rica was also an active participant in regional and global activity promoting NCA. In addition to contributions to the Annual Partners Meetings, Henry Vargas of the Central Bank was a member of Policy and Technical Expert Committee, and delegates from Costa Rica were a part of:

- First WAVES Knowledge Exchange Workshop on Ecosystem Accounting (February 2015)
- Global Forest Accounting Workshop (December 2014)
- Workshop on Natural Capital Accounting for Latin America and the Caribbean (May 2014)

Several popular articles have appeared in the local media and one article won an award:

- Impacto sobre “capital natural” pesaría en aval a construcciones (May 2014)
- Costa Rica calculara bosques economia
- Nacion reconocimiento trabajos ambientales
- Costa Rican journalist receives regional prize writing on natural capital accounting

4.4 Governance and Project Management

A WAVES Steering Committee was formed and the membership included key agencies, namely:

- Ministry of Planning (MIDEPLAN);
- Ministry of Finance (MH);
- Ministry of Environment and Energy (MINAE);
- Central Bank (BCCR); and
- National Institute for Statistics and Census (INEC).

The representatives were high-level officials: ministers (MINAE) or vice-ministers (MH and MIDEPLAN), director (BCCR), and manager (INEC). As such, the Steering Committee could make the decisions on the budget and work plan and on publishing reports.

The Central Bank took the lead in producing the accounts, coordinating at a technical level as needed with other agencies. Two TWGs were established, one for water and one for forests. The Central Bank also produces the national accounts.

4.5 Capacity Building

The staff producing the accounts in Costa Rica have taken part in a number of national, regional, and international workshops and training courses. In addition, these staff “learned-by-doing,” with support from the WAVES program.

A mixture of local and international consultants was used to provide support for account production. Consultants were involved in training as well as assisting with account preparation. Technical assistance included the following:

- water accounting, 2013–16, local contractor (Lucrecia Salazar) and international experts (Ricardo Martinez-Lagunes);
- forest accounting, international experts (Juan-Pablo Castaneda, David Bain);
- energy accounting, 2016, international expert (Rocky Harris); and
- ecosystem accounting, 2015–16, international experts (Lars Hein and Ken Bagstad).

4.6 Institutionalization

Concrete steps have been taken to institutionalize the production of NCA in Costa Rica. This includes the establishment of an NCA unit in the Central Bank, with staff appointed for the ongoing production of water, forest, energy and CO₂ accounts. The two TWGs will also continue.

Costa Rica has a draft roadmap for activity beyond WAVES. It provides a clear vision for NCA covering both account production and how accounts might be used in government for generation of indicators and to address issues such as green growth.

4.7 Account Applications

So far work has focused on the production of accounts rather than their application. The accounts have only recently been released, so direct applications of the data within them are yet to occur.

Potential applications of accounts to the production of indicators, national development planning, green growth, natural resource management, land-use planning and climate change are evident, but not yet fully explored.

Potential uses for water accounts for policy and decision making have been recognized. These include water pricing, investment in water supply

infrastructure, and alternative water sources. These also include links beyond the water sector to agricultural production and food security.

Similarly, potential uses of forest accounts have also been recognized. In particular, the linking of forest accounts to CO₂ emission and carbon accounts and the ecosystem service of carbon sequestration, which would be relevant for entering regional or global carbon markets for the abatement of CO₂ emissions.

4.8 Conclusions

Costa Rica has political commitment at the highest level and the country recognizes natural capital as a priority for development. So far accounts for water, land and forests as well as energy and CO₂ emissions have been completed.

Institutionalization of account production has occurred. An accounting unit has been established with ongoing funding in the Central Bank and the National Steering Committee and TWGs established will continue. In addition, the production process used to generate the accounts has used existing information systems. Data gaps and deficiencies in the Costa Rica information system (such as the aggregation of industries in the national accounts) were identified and steps are being taken to address these.

While the potential of NCA is clearly recognized by government, the capacity within government to use the accounts in, for example, analyses to support government decision making, is limited. There is, however, capacity for this outside of government, and over time capacity could be developed within government.

Costa Rica has had success in institutionalizing the production of natural capital accounts. This now needs to be followed up so that the accounts can be produced annually and incorporated into government policies and decision-making processes. Strong leadership and a concerted effort to manage and monitor the processes established beyond WAVES will be required.

4.9 The Way Forward for WAVES in Costa Rica

Costa Rica has developed institutional arrangements that allow the recurrent production of natural capital accounts for water, energy, CO₂ emissions, land, and forests (as per the SEEA Central Framework). Ecosystem accounts are also being developed. The key challenges now are to sustain production of the accounts and to incorporate the accounts into government policy and decision-making processes.

With these challenges in mind, and recognizing that no final decision has been made, WAVES+ in Costa Rica may be able to assist in:

- Finalization of the ecosystem accounts;
- Development of indicators and communication of messages to high-level officials;

- Work on the application of the accounts to particular issues, such as green economy, OECD accession, land-use planning, the update of the PES scheme as well as inputs to macroeconomic models;
- Design and application of a process for linking NCA to policy and decision making;
- Technical assistance with monetary accounts for income from natural resources and environmental protection expenditure as a tool for discussion on the environmental fiscal policy space;
- Broader engagement with the technical NCA community (for example, through the London Group); and
- Capacity building (mostly through the regional component) and possibly targeted development of “young NCA professionals.”

The finalization of the Costa Rica roadmap will greatly aid discussions about possible support for Costa Rica in WAVES+.

5. Madagascar Assessment

5.1 Background

This report is based on a variety of inputs including:

- The response to the WAVES Country Assessment Questionnaire;
- An Assessment Mission conducted February 8–12, 2016;
- An examination of the information available and the accounts in production;
- Follow-up questions and discussions with those involved in the production and potential use of environmental accounts in Madagascar;
- The 2015 WAVES Madagascar Country Report; and
- The IMF Madagascar Systematic Country Diagnostic (August 2015) and related discussions.

Madagascar has:

- A population of 23.6 million;
- An area of 587 thousand km²;
- A gross national income per capita of US\$440 (low income);
- An unstable government (see 2015 WAVES Madagascar Country Report);
- No history of environmental accounting; and
- Trust funds disbursement at March 31, 2016 of US\$0.504 million

Madagascar is an island nation lying to the east of Africa in the Indian Ocean, with a range of natural resources, including high levels on endemic biodiversity. The country has had decades of political instability and declining levels of effective governance. In March 2009, following months of social unrest against the mayor of the capital Antananarivo Andry Rajoelina seized power from the President Marc Ravalomanana, with the support of the army. As a result of this unconstitutional change of government, donors withdrew their support and Madagascar became increasingly isolated. Under the auspices of the Southern African Development Community's (SADC) lead mediator, the protagonists signed a roadmap to end the political crisis in September 2011, leading in November 2011 to the formation of a consensus government led by neutral Prime Minister Omer Beriziky. The presidential elections were held in as a two-phase process in October and December 2013. Neither Mr. Rajoelina nor Mr. Ravalomanana were permitted to run.

The elections saw the victory of Henry Rajaonarimampianina, Rajoelina's proxy candidate. However, upon gaining power, M. Rajaonarimampianina quickly distanced themselves from Mr. Rajoelina and his supporters. A government backed by political forces opposed to Rajoelina was nominated in March 2014 under the direction of Prime Minister Kolo Roger. In his first year in power, the

president improved his political base, and having deemed the Prime Minister ineffective and weak, replaced him in January 2015 with General Jean Ravelonarivo, who proceeded to reshuffle government. In April 2016, General Ravelonarivo was asked to step down and a new government, the third within three years, was formed and is led by Mr. Olivier Mahafaly Solonandrasana.

5.2 Account Production and Data

Madagascar launched a WAVES program in September 2011. By 30 June 2016, a water account had been produced but is not yet public. Accounts for minerals, forest and coastal ecosystems were identified for production and the production of some of these has proceeded, while a first draft of macro-economic indicators has been produced (Table 1). These are discussed briefly under separate headings below. It is noted that the construction of environmental accounts is made extremely difficult by the absence of recent national economic accounts and limited environmental data. These issues are addressed later in the report.

Table 5.1. Summary of Natural Capital Account Production in Madagascar

Account	Production status	Agency responsible	Notes
Water			
- <i>Physical SUT</i>	1 st draft near complete but not yet public		A consultant is working with the project team to finalise a 1 st draft for the year 2007
- <i>Physical Asset</i>	Completed draft but not yet public		A simplified account has been prepared and a separate consultant has been employed to provide a water balance for the year 1960 to 1990 and 2001 to 2013
- <i>Monetary SUT</i>			
Forests			
- <i>Physical Asset</i>	In preparation		Draft forest cover tables have been prepared
- <i>Monetary SUT</i>	In preparation		
Minerals			
- <i>Physical Asset</i>	In preparation		1 st draft of tables produced
- <i>Monetary Asset</i>	In preparation		1 st draft in review
Macro-indicators	In preparation		1 st Draft prepared for the year 2005-2013 and in review
Costal ecosystems	Not attempted		

Water accounts

The physical and monetary supply and use table of the water accounts were completed but are not yet publically available nor made available in time for this review so were not able to be assessed against the data quality criteria. Two areas were identified as important for irrigated agriculture – Marovoay and Lake Alaotra.

Based on discussions with project staff, there is a lack of basic data and many estimates will be based on modeling and the use of coefficients (for example, the relationship of water use in particular industries to number of employees or economic production measures). Information based on hydrological models is being generated for a traditional water balance and transferring this to the framework of the physical water asset account should be possible.

Forests

Estimates of timber volume and forest area of Madagascar were carried out in March 2015. Training on the methods of estimation was undertaken. In January 2016, calculations for a first draft of the timber accounts have been compiled by the Technical Working Group. The latter has planned to produce communications materials on the timber accounts but a date is not yet set.

Minerals

A first draft of the tables for the mineral accounts was presented on screen to the Assessment Mission but a written report was not available for review. A report on this work is planned but it is not clear when it will be available.

Macro-economic indicators

A first draft of the macro-economic indicators Total Wealth and Adjusted Net National Saving has been produced and is in review. This work was presented to the Assessment Mission on screen but again a written report was not available for review.

Accounts not produced

Coastal ecosystems accounts were identified in project planning but were not attempted.

Data

There are many data limitations in Madagascar. The last year for which national accounts are available was 2001, with information for 2007 expected later in 2016. Environmental information is scattered and patchy. International data sources were identified and consultants were used to model hydrological data that could be used in water accounts.

5.3 Communication and Information Sharing

Two policy briefs and two country reports have been produced for Madagascar. The policy briefs are on the WAVES Web site:

- [Valuing Ecosystem Services in the CAZ Forestry Corridor](#)
- [Natural Capital Accounting and Management of the Malagasy Fisheries Sector](#)

Leon Rajaobelina, an Advisor of the President of the Republic of Madagascar and Regional Vice President of Conservation International is a strong advocate of NCA nationally and has been prominent in WAVES Annual Partnership Meetings.

NCA has been mentioned in the press in a number of occasions, particularly through the words of policy makers and technicians involved in the program. Recently (April 2016) the Director General for Planning, Mamy Ratolojanahary, mentioned the WAVES partnership while asserting that good governance means seeing economic development through the lens of sustainable development.

5.4 Governance and project management

The leadership of the WAVES in Madagascar was in the Ministry of Economy. The Ministry is responsible for the management of the economy and the coordination of economic policies and as such is the appropriate institution for this role. The WAVES Steering Committee was co-chaired by the Secretary-General of the Ministry of Economy and by the Regional Vice-President for Conservation International. The Committees' membership was drawn from the line ministries, namely: water; environment; fisheries; forests; mining and; coastal zone management. Private sector representatives from mining and tourism were also included on the committee. In addition, four Technical Working Groups were established. These were for water, minerals, macro-economic indicators and forests.

The operation of the Steering Committee was problematic. It met infrequently and there was no meeting from February 2014 to December 2015. The membership of the Committee was also unstable. The latter reflected the instability in the government. In addition, members of the Committee were appointed as individuals, not as positions in government. As such when an individual left the position, it could not automatically be taken by their successor and positions were left vacant for extended periods of time. The result was that the Technical Working Groups were left with little guidance or managerial support for the production of accounts.

At the time of the Assessment Mission (February 2016) there was not yet a vision for NCA beyond WAVES but the drafting process for Country Road Map should help to define this.

5.5 Capacity Building

A mixture of local and international experts provided support for the production of accounts in Madagascar. The experts were involved in both training as well as assisting with the preparation of accounts.

A key limitation in capacity building for Madagascar was the availability of French speaking experts and materials to support implementation. There was no known regional or local expertise on NCA on which to draw. Internationally, available French speaking experts were (and remain) few. Late in the program, regional French speaking expertise was identified in near-by Mauritius.

5.6 Institutionalization

There has been some progress towards institutionalize of NCA production in Madagascar. In particular, a NCA team was established in the Ministry of

Economy in 2014. Technical Working Groups for water, minerals/macro-indicators and forests remain in place.

The unsettling political environment, a lack of basic environmental data and the absence of national economic accounts have hampered institutionalization. The IMF will shortly begin a program aimed at increasing the capacity of the national statistical institute to produce the national economic accounts, while others are undertaking projects that should identify or generate additional environmental data. Having more up-to-date national accounts and access to additional environmental data will be pre-requisites for Madagascar to produce and institutionalize natural capital accounting.

5.7 Account Applications

Since natural capital accounts are yet to be made publically available in Madagascar, it is un-surprising that there are no examples of their application to public policy or decision-making. Conceptual use of the accounts has been made in statements by senior officials recognizing the importance of NCA and in the policy briefs.

Potential applications to the management of mineral resources, and the capture of resource rents via royalties have been identified. Sustainable development is an aim of the government and accounts can provide some of the indicators for monitoring the Sustainable Development Goals. Other potential uses have been identified, include managing timber extraction from forests and water pricing to enable investment in water supply and sewerage infrastructure.

5.8 Conclusions

The production and use of natural capital accounting in Madagascar will be a long-term project. While Madagascar has had high level political commitment to natural capital accounting and recognizes natural capital as a priority for development, this support has not translated into an effective accounting program.

Account production has been very slow and hindered by instability in government and the resulting low demand for policy relevant information. Exacerbating this is a lack of basic information (including no recent national economic accounts), no previous experience in NCA, limited local expertise and a limited number of French speaking international experts or French materials to support capacity development. The knowledge and skills of people producing accounts in Madagascar has increased within government but the challenges with basic data availability are great.

A clear vision, continued strong leadership and high levels of support from managers, will be needed along with substantially improved environmental information and up-dated national accounts.

5.9 The Way Forward in Madagascar

Development of natural capital accounting in Madagascar will be a long-term project. Basic statistical infrastructure is poor and public administration is still recovering from years of instability.

The Country Roadmap will provide the vision for Madagascar and it will be important that the practical steps that need to be taken are identified and recognized. Once the roadmap is prepared it will be evaluated to see where WAVES+ may have a role.

As an indication, WAVES+ could investigate working with the IMF on their project to increase capacity with economic statistics and in particular the national accounts. There is a natural area of overlap with the natural resource industries (agricultural, forestry, fishing, water supply and energy) as well as the natural resources on the balance sheet.

WAVES+ could build on the recent progress made on water account production and explore how to institutionalize production and apply to the issue of financing water supply and sewerage infrastructure. This would be dependent on the publication of water accounts containing suitable information.

The regional component of WAVES+ will likely build on the existing WAVES partner countries, and is designed to provide support to regional capacity building, south-south learning and networking, which Madagascar will be able to participate, build capacity and share experiences.

6. Philippines Assessment

6.1 Background

This report is based on a variety of inputs including:

- The response to the WAVES Country Assessment Questionnaire returned in February 2016
- An Assessment Mission conducted 4-8 April 2016
- An examination of the accounts being produced
- Follow-up questions and discussions with those involved in the production and use of environmental accounts
- The 2015 WAVES Philippines Country Report

Philippines has:

- A population of 99 million
- An area of 298,170 km²
- A gross nation income per capita of US\$3,500 (lower middle income)
- A stable national government
- A long but intermittent history of environmental accounting program beginning in 1992
- Joined WAVES in February 2012
- Trust fund disbursement at March 31, 2016 of US\$1.308 million

The Philippine archipelago, located in the western Pacific, is rich in biodiversity, coastal and marine resources, minerals, and timber. This natural resource wealth underpins the livelihoods of farmers and fishermen and provides an important social safety net especially for the rural poor during times of crisis. Responsible management of natural capital is also critical to ensure future profit streams for private enterprises in the tourism, agriculture and mining sector as well as revenue to local and national governments.

Despite sustained levels of economic growth over the last few years, the Philippines still suffers from relatively high levels of poverty. Keen to promote a growth path that is both sustainable and inclusive, the Philippines has identified several options for development, including nature-based tourism and the expansion of responsible mining and agriculture. A key questions facing the country is how to optimize natural-resource use to achieve these goals, especially when faced with a rising incidence and severity of natural disasters and a growing population.

The Philippines has a history of natural capital accounting going back to the 1990s (for example, NSCB 1998 Asset Accounts) as well as valuation of natural resources. The government's initial activity directly followed the Rio Agenda 21. In this there were two projects. The first was the Environmental and Natural

Resources Accounting (ENRAP, 1991-2000) project, funded by the United States Agency for International Development (USAID). The DENR was the main government project counterpart. The National Economic Development Authority (NEDA) and the National Statistical Coordination Board (NSCB) were also involved from the start of the project. The National Statistical Office (NSO), the Department of Agriculture and the PCSD were represented at the ENRAP Steering Committee together with representatives from NEDA, NSCB and DENR. The second project was funded by the United Nations and was led by the national statistical office.

The WAVES project in Philippines used a different funding arrangement from that used in other countries. In the Philippines two different mechanisms were used for funding. The two ecosystem accounts used Bank Executed Trust Fund, while a Recipient Executed Trust Fund was used for the mineral and mangrove accounts. It took around one year to establish Recipient Executed Trust Fund, due to the administrative processes of the both the World Bank and the Philippine Government, and hence the funding for these extends to 30 June 2017.

6.2 Account production and data

As part of the WAVES program, the Philippines has developed pilot ecosystem accounts for two regions – Southern Palawan and the Lake Laguna basin as well as draft mineral account covering, gold, copper, nickel and chromite (Table 6.1). A scoping paper for mangrove accounts has been produced and investigations are continuing. Macro-economic indicators have also been investigated and production of these is scheduled to begin after the completion of the minerals accounts. These accounts and related work are discussed briefly under separate headings below. This includes accounts initially identified but did not proceed to a production phase.

At present the pilot ecosystem accounts and the draft minerals accounts have limited availability. They are not on the web and so far, have only been distributed to a small number of experts for the purpose of review. As such in the data quality assessment they have scored poorly in the accessibility dimension. Once the accounts are available more broadly (for example, on the web) the score will rise. A related dimension is timeliness. If the production process, and in particular the clearance processes, can be accelerated then in future accounts the score for timeliness would also improve.

The current plan is for accounts to be published as PDF files. The addition of downloadable information that can be imported directly to spreadsheets (for example, Excel or other standard database or analytical software) would aid use by the analytical community.

Table 6.1. Summary of Natural Capital Account Production in the Philippines

Account	Production status	Agency responsible	Notes
National level			
Mineral			
- <i>Physical Assets</i>	In preparation	PSA and DENR	Drafts tables for four minerals available Dec 2015
- <i>Monetary Asset</i>	In preparation	PSA and DENR	Drafts tables for four minerals available Dec 2015
Mangroves	Unpublished scoping study completed	PSA and DENR	Scoping study completed in Sep 2015
- <i>Physical asset (extent)</i>	In preparation	PSA and DENR	Data available now but not yet formed into an account
- <i>Ecosystem service flows</i>	In preparation	PSA and DENR	Being investigated are services such as carbon sequestration, storm protection as a subnational case study
Macro indicators			Work is pending the completion of minerals account
Regional			
Southern Palawan			
- <i>Land cover (ecosystem extent) physical assets</i>	In preparation	DENR and PCSD	2 nd Draft report in October 2015 in review. Publication expected in June 2016
- <i>Ecosystem condition</i>	In preparation	DENR and PCSD	2 nd Draft report in October 2015 in review. Publication expected in June 2016
- <i>Ecosystem services</i>	In preparation	DENR and PCSD	2 nd Draft report in October 2015 in review. Publication expected in June 2016
Lake Laguna basin	In progress	LLDA	2 nd Draft report in October December 2015 in review. Publication expected in June 2016
- <i>Land cover (ecosystem extent) physical asset</i>			
- <i>Land use (partial)</i>			Protected areas
- <i>Water physical asset</i>			
- <i>Water quality</i>			Not yet an account
- <i>Water emissions physical flows</i>			
- <i>Fish provisioning</i>			

Southern Palawan ecosystem accounts

The Department of Environment and Natural Resources (DENR) and the Palawan Council for Sustainable Development (PCSD) jointly prepared the accounts for the Southern Palawan. These accounts are in advanced stages of

production. National and international experts reviewed a draft in September 2015 and a 2nd draft including the comments of reviewers was completed in December 2015. In the assessment mission the accounts were described as “70% complete”. Subsequent to the mission all technical work ended and the remainder of the work is formatting and administrative processes. For this review, the draft of the accounts from December 2015 was compared against the data quality assessment framework (Table 6.2).

Table 6. 2. Data Quality Assessment of the Southern Palawan Accounts

Dimension of data quality	Rating	Comments
Relevance	High	The accounts are directly related to issues of regional importance and in particular to sustainable development of the region and land use planning.
Accuracy	Moderate	A range of primary and secondary data sources have been used to generate the estimates included in the accounts. A local and international review process has been used and the results have also been tested with key stakeholders.
Timeliness	Moderate-high	The accounts included in the report are for a range of time periods. The most recent data are for the reference year 2014
Accessibility	Low	A draft report was shared with key stakeholders in October 2015. The pilot accounts are expected to be published in July 2016.
Interpretability	Moderate	An executive summary and table is included in the report. The development of summary indicators would assist interpretation by non-experts. A number of figures and maps have been prepared to complement the table. A time series is available for some accounts. Information of the data sources and methods is presented.
Coherence	Moderate	SNA and SEEA concepts and recording conventions have been used, although some of the terminology varies. Links between the asset and flow accounts are unclear and no attempt is made to link to the existing SNA data available at the industry or regional level. As such, coherence with these data are unknown but probably low.

The format of the accounts presented within the report is variable. The suggested formats of the accounts in the SEEA Experimental Ecosystem Accounting could be used as a starting point. Accounts for the ecosystem services of carbon storage and carbon sequestration are presented. A carbon asset account was not prepared, although from the data included it may be possible to produce.

The land cover accounts for the Southern Palawan are consistent with those from the SEEA Central Framework (and these are the same as the ecosystem extent accounts in the SEEA Experimental Ecosystem Accounting). The

information on water quality and emissions to water (for example, of sediment) could be aligned with the SEEA-Water.

The inclusion of summary indicators and improved summary would strengthen the report.

Lake Laguna basin ecosystem accounts

The accounts for the Laguna lake basin were prepared by the Laguna Lake Development Authority (LLDA). A large amount of information has been compiled and included in a draft report “Pilot Ecosystem Account for the Laguna de Bay Basin”. The draft is now in its second iteration and is expected to be published later in 2016. The draft account from October 2015 has been assessed against the data quality framework and is presented in Table 6.3.

Table 6.3. Data Quality Assessment of the Pilot Lake Laguna Accounts

Dimension of data quality	Rating	Comments
Relevance	High	The accounts are directly related to issues of regional importance and in particular to sustainable development of the region and land use planning.
Accuracy	Moderate	A range of primary and secondary data sources have been used to generate the estimates included in the accounts. A local and international review process has been used and the results have also been tested with key stakeholders.
Timeliness	Moderate	The data are available for a range of time periods. 2010 is the latest land for land, while 2014 for fish production and emissions to water.
Accessibility	Low	A draft report was shared with key stakeholders in October 2015. The pilot accounts are expected to be published in July 2016. Until they are published accessibility is low.
Interpretability	Low-moderate	An executive summary and table is included in the report. A number of figures and maps have been prepared to complement the table. Much of the information is not in an accounting format. Time series is available for some information. Information of the data sources and methods is presented. Some qualifications on the scope and coverage of particular information are needed. This is especially so for water quality which has limited spatial coverage and considers a single aspect of water quality (BOD).
Coherence	Moderate	The terminology in the report is not always consistent with SEEA, while the tables are in a variety of formats and not in a standard accounting format. Links between the asset and flow accounts not clear. In addition, no attempt made to link to the existing SNA data available at the industry or regional level so coherence with these data are unknown but probably low.

Minerals accounts

The Philippines Statistics Authority is compiling monetary mineral asset accounts. Draft accounts for four minerals have been completed – gold, copper, nickel and chromite. Together the production of these minerals contributes around 60% to mining Industry Valued Added. Additional minerals are planned to be added to the account.

First estimates were produced in December 2014 and were validated January-December 2015 using a variety of processes. In particular, the Inter Agency Committee on Environment and Natural Resource Statistics Technical Working Group on Mineral Resources Statistics was consulted. Workshops were also held with key stakeholders (for example, on 28 December 2015).

Table 6.4 Data Quality Assessment of the National Mineral Accounts

Dimension of data quality	Rating	Comments
Relevance	High	The accounts are directly related to issues of national importance and in particular the pricing of mineral royalties.
Accuracy	High	The review process has been extensive and major.
Timeliness	Low	The latest accounts are for 2012. A law/decision on mineral royalty pricing is before parliament and data is needed for this decision.
Accessibility	Low	A draft report was shared with key stakeholders in December 2015. The accounts are expected to be published in the 4 th Quarter 2016.
Interpretability	Moderate	Tables and some figures have been prepared. A long time series is available for the minerals. Only limited information of the data sources and methods are available. Coverage is limited to four minerals.
Coherence	Moderate	SNA and SEEA concepts and recording conventions have been used.

Mangrove account

A scoping paper has been produced and was discussed at a workshop in October 2015. It was agreed by the Government that the mangrove accounts will be developed at two levels:

- (1) National scope - mangrove extent and hazards; and
- (2) Pilot sites – mangrove associated product (fish production), biomass and carbon sequestration, and ecotourism.

A work program has been prepared with pilot accounts due for publication by March 2017. A seminar and field trip was held in February 2016 to support the development of the accounts, while a planning workshop is scheduled for the second quarter of 2016. This workshop aims to map out specific activities to be undertaken in the development of mangrove accounts.

Accounts identified but not produced

A number of accounts were identified during the scoping phase of the project but were not progressed. These included national: land accounts (cover and use);

energy (coal, natural gas and oil); water (physical accounts); agricultural accounts (physical accounts); timber accounts (physical and monetary) and; the Cordillera Administrative Region (CAR)

Macroeconomic indicators were identified but work on this has not yet occurred. This will be started after the completion of the minerals accounts and work is expected to begin in the 2nd half of 2016.

The decision not to proceed with such a large number of addition accounts is entirely justified. The resources needed and the capacity to produce these would have been great and would have led to a dilution of resources available for other accounts.

Data

Data in the Philippines is held by a large number of agencies at national and subnational levels as well as in the private and NGO sector. Different agencies use different definitions and classification of data, while spatial data is from a variety of resolutions (for example, 30 m² or 250 m²) and is stored in different geographic projections.

A particular issue for the data needed from the SNA in environmental and ecosystem account is the aggregation of the data related to the agriculture, forestry and fishing industries in the national accounts (which are combined together). The water supply, sewerage and energy industries are also combined. The disaggregation of these industries would greatly enhance the usefulness of both the national capital accounts and the national accounts for analysis and policy-making.

Subnational estimates of parts of the SNA are available at a regional level. Integration of the work in the Southern Palawan and Lake Laguna basin ecosystem accounts would provide an extra dimension to the work, and in particular allow links specific industries, namely agriculture, forestry, fisheries water supply and sewerage.

6.3 Communication and Information Sharing

The Philippines has undertaken a range of communication and information sharing activity. A feature was that a communication strategy was in place early in the WAVES program and resulted in a range of media coverage (Table 6.5).

In addition, media coverage, sheets addressing frequently asked questions (FAQs), and a 2- and 5-minute multimedia video on ecosystem accounting, as well as two policy and one country briefings, were developed. This included:

- Ecosystem Accounts for Southern Palawan, Philippines
- Ecosystem Accounts for Laguna de Bay, Philippines
- Country Brief: Philippines - Natural capital accounting as a planning tool

Table 6.5. Examples of Media Coverage in the Philippines

Neda, World Bank to assess natural wealth	http://manilastandardtoday.com/business/170947/neda-world-bank-to-assess-natural-wealth.html
NEDA, WB partner to assess PH's natural capital wealth	http://www.manilatimes.net/neda-wb-partner-to-assess-phs-natural-capital-wealth/163983/
PH bats for 'ecosystem accounting'	http://www.rappler.com/business/economy-watch/84323-project-waves-toward-sustainable-development
PHL pursues project that boosts natural-resource use, achieves inclusive growth	http://www.pna.gov.ph/index.php?sid=6&pfn=737001&arch=1&go=Go&search_arch=WAVES&andor=and&mdte_arch=2&ddte_arch=18&ydtte_arch=2015
Training on Wealth Accounting Indicators, the Philippines	https://www.wavespartnership.org/en/knowledge-center/training-wealth-accounting-indicators-philippines
MTMD participates in PSA Phil-WAVES Project validation workshop Mines and Geosciences Bureau, March 11, 2015	http://www.mgb.gov.ph/art.aspx?artid=755
PHL rekindles efforts to measure natural resources for policy development, economic planning	http://www.gmanetwork.com/news/story/439875/money/phl-rekindles-efforts-to-measure-natural-resources-for-policy-devt-economic-planning
Natural capital accounting: balancing ecological protection and economic growth	http://blogs.worldbank.org/eastasiapacific/natural-capital-accounting-balancing-ecological-protection-economic-growth
Editorial: Studying the state of natural resources, finally	http://archive.sunstar.com.ph/davao/opinion/2014/05/30/editorial-studying-state-natural-resources-finally-345614

6.4 Governance, Institutional Set-Up and Project Management

WAVES Steering Committee was established in the Philippines it was chaired by National Economic and Development Agency (NEDA) and included representation from:

- Department of Budget and Management
- Department of Finance
- Philippines Statistics Authority
- Department of Environment and Natural Resources
- Climate Change Commission
- Department of Agriculture
- Office of the Presidential Advisor on Environmental Protection
- Union of Local Authorities

The Steering Committee met six times: 26 July 2013; 30 January 2014; 30 September 2014; 3 March 2015; 22 July 2015 and; 15 April 2016.

In addition to the WAVES Steering Committee there was a parallel work via an Interagency Committee on Environment and Natural Resources Statistics, which was established on 23 December 2014. The Interagency Committee in turn formed five Technical Working Groups on 31 March 2015. The Technical Working Group were for: disaster statistics; energy resource statistics; land and soil statistics; mineral resources statistics and; water resource statistics

The mineral resources committee of the Interagency Committee was used to guide work on the mineral accounts. The members of the WAVES Steering Committee, Interagency Committees and Technical Working Groups were all government employees.

In addition to the Interagency Committees Technical Working Groups, WAVES established two additional TWGS for the Southern Palawan and Lake Laguna basin accounting projects. The one for Lake Laguna basin was almost entirely of LLDA staff, while the TWG for Southern Palawan was co-led by the DENR and PCSD.

6.5 Capacity Building

Capacity building was undertaken in a number of ways. A number of workshops and training sessions were conducted within the Philippines over the course of the project. In addition, staff involved in the project attended regional and international seminars and workshops. This included a participation in the SEEA training course run jointly by the Australian Bureau of Statistics and Australia National University. Most of this training was at an introductory or intermediate level. A summary of the training is provided in table 6.6.

Table 6.6 Training and Workshops in Support of Account Production

Workshop for Ecosystem Account for Southern Palawan, September 2013
Ecosystem Accounting Training in February 2014
Workshop on the Fundamentals of Accounting as Applied to Ecosystem Accounting in June 2014
Data Integration and Analysis Workshops on ecosystem accounts in August 2014
Module 2: Ecosystem Accounting Training in September 2014
Training on the 2012 System of Environmental Economic Accounting (SEEA) and its linkages to the 2008 System of National Accounts (SNA) in September 2014
Technical Workshop on Ecosystem Accounts in November 2014
1 st Knowledge Exchange Workshop on Ecosystem Accounting in February 2015
Training on Wealth Accounting Indicators in April 2015
Training on Policy Analysis for the ecosystem accounts in December 2015

For more advanced capacity building, the training sessions and workshops were augmented by a mixture of local and international experts providing support for the production of accounts. These experts worked in country with the production teams on the generation of the accounts. The experts were also able to provide support remotely, answering questions via email.

Support was also provided by regular teleconferences between the two pilot ecosystem accounting projects and the Australian Bureau of Statistics. This was sometimes hampered by poor telecommunications in Southern Palawan.

6.6 Institutionalization

Steps have been taken to institutionalize the production of NCA in the Philippines. This has occurred in all of the agencies involved in the production of the accounts.

The PSA has established a unit for NCA called the Environment and Natural Resources Accounts Division. Nine positions are attached to the unit but only two are permanently filled. An extra three project staff are employed for the Compendium of Environmental Statistics which is to be produced biennially (last produced December 2014 and next expected in December 2017). A database to support the compilation of mineral accounts has been developed.

Within DENR the Foreign Assisted and Special Project Service (FASPS) is in close coordination with the Knowledge and Information Systems Service (KISS) and the Planning and Policy Service (PPS). This group is intended to provide support to the creation of the accounts and is involved in the policy analysis stage. This undertaking will include recommendations on the policy reform that will need the strong support of the DENR management.

The focal point for natural capital accounting at LLDA is the Environmental Laboratory and Research Division. A range of staff is involved and they are assisted by the Technical Working Group, drawn from the various divisions within the LLDA. A proposal for the designation of a NCA focal unit, NCA team, statistical and data management unit within LLDA is in preparation. This will be used for discussion with the management, and approval of Secretary and the Board.

Within the LLDA fish surveys are being harmonized. Information needed for NCA by LLDA is now included in the fish survey of PSA and Bureau of Fisheries and Aquatic Resources. Surveys now include the questions needed by LLDA for accounting.

At PCSD natural capital accounting will be hosted in the Policy, Monitoring and Knowledge Management unit. Currently the equivalent of two full time staff is allocated to work on the ecosystem accounts (one full time, two part-time). The intention is to integrate the accounts and the accounting framework in data collection, monitoring and policy analysis within PCSD.

Capacity building on NCA and the Palawan Ecosystem accounts is planned for: (1) PCSD staff; (2) NGO and other local partners, including City tourism office; (3) seminar for PCSD council, City Council and the Provincial Board. The work plan for 2016/2017 includes setting up database systems, protocols for data collection and data sharing, as well as developing a guidebook for the ecosystem accounts. Setting up routines for reporting of metadata and quality assessment will be done in collaboration with PSA.

PCSD has established Palawan Knowledge Platform – 18 agencies have signed up and agreed in principle to share data and expertise. For data, agreements are still pending and how to harmonize data collection activity and different classifications are issues identified to be addressed.

NEDA with the Phil-WAVES will lead the institutionalization of the NCA in coordination with PSA, DENR and LLDA and other concerned government agencies. The institutionalization activities that will be undertaken include (but are not limited to): the development of a guidebook, identification of data sharing mechanisms, and establishment of a database system. In place of the Phil-WAVES Country Coordinator, NEDA will engage a local expert to oversee the policy aspect and institutionalization plan as well as oversee the remaining activities of WAVES until April 2017.

6.7 Account Applications

Draft natural capital accounts have only recently been developed and are not yet widely available or known to the analytical or policy communities. As such direct application of the accounts to policy and management has not yet occurred.

The process of account production has led to the identification of data issues (for example, in the Palawan use of different classifications of land cover) and improvements to the information system (for example, extension and harmonization of surveys on fish production). Also as a result of work on accounts, the LLDA has had a number of data requests from academics.

Uses in policy are beginning. NCA is recognized in the National Development Plan, while land and water qualities were used in the 2016 update of the Lake Laguna Master Plan.

Several potential uses of the accounts are being investigated and with approximately one year to run in the project several seem likely to provide examples of how NCA can be applied. Uses being investigated include:

- applying NCA to supply of indicators for SDGs (and the Philippines is one of the pilot countries for the UN SDGI project);
- green economy indicators;
- minerals pricing, a law in parliament;
- land planning/zoning sustainable development plan for Palawan, Strategic Environmental Plan for Palawan and Environment Monitoring and Evaluation System (EMES and EMES + plus – adding socioeconomic data to EMES).

- implementation/enforcement of laws and planning regimes, Environmental Critical Areas Network (province wide zoning-management plan);
- possible entry into carbon-trading schemes;
- water pricing;
- fish management in the Palawan (closed seasons, bag limits, size limits, and so forth.), pricing of permits;
- management of aquaculture (fee for fish pens in Lake Laguna, reduction in extent and impact);
- updating the Lake Laguna Master Plan (2015), approved by the Board, and the executive summary on line, land cover account water quality information used;
- water pollution and investment in water treatment infrastructure (for example, treatment of domestic wastes);
- reducing the risk of flooding and level of damage from flooding; and
- management of public finances (in Palawan).

There are some specific policy objectives for LLDA that can be addressed through accounts, including reducing BOD loads, sedimentation and urbanization.

In the Palawan the sharing of the income generated by mining and impacts of mining on the coastal and marine ecosystems is an area of interest with a large potential impact.

In addition, WAVES has improved communication between different institutions involved in data, statistics and accounting. The increased interaction and exchange between institutions engaged in data generation should enable more effective collection and use of data.

6.8 Conclusions

Natural capital accounting is recognized as very important at high levels of governments in the Philippines.

Much progress has been made on account production. Two reports on ecosystem accounts are in the final stages of production, while national mineral accounts are in progress with draft accounts available for four minerals (gold, nickel, copper, chromite). A case study on mangroves is underway. In order to complete the mangroves accounts before the end of the first phase of WAVES involvement, in the Philippines (April 2017) fast work will be needed along with greater clarity on who and how the accounts will be used.

The institutionalization of account production is occurring nationally within PSA and DENR as well as regionally in the PCSD and LLDA. Data quality assessment process can be refined. As part of this existing data coordination mechanisms are being actively used in the account production process (with clear examples for minerals and fish). The PSA is planning to produce regular mineral accounts and

it should be a process of continuous improvement. The DENR is expecting that the methodologies and framework used for the Southern Palawan ecosystem accounting pilot can be applied in different settings (i.e. in other parts of the country). PCSD is determining which accounts are the most feasible to sustainably produce in the mid-term and to see what decisions and regular management process the accounts could inform and has dedicated the equivalent of two fulltime staff to account accounting.

A focus on the development of account production process is needed and better links to the aspects of data quality of most interest to policy analysts is needed. At present account producers prioritize accuracy and coherence, whereas the dimensions of data quality of more interest to policy makers and analysis are accessibility, relevance, timeliness and interpretability.

Possible uses of accounts to analyze a range of issues have been identified and need to be advanced as a matter of priority. A specific key opportunity is for the mineral accounts to inform the debate about appropriate pricing of minerals, which is currently before parliament. The accounts may also be able to serve regional management authorities that demand indicators, tools, and methodologies to inform development planning and policy analysis in support of the goals of sustaining the use of natural resources, economic growth, and alleviating poverty.

A significant achievement in the development of the accounts was bringing together the data producing agencies and the identification of data gaps and deficiencies in the Philippines information system.

Local capacity to produce accounts in government is increasing and currently at a moderate level. Locally, there is also capacity outside of government in, for example, the universities. Learning by doing was an important component of capacity development and in this working on regional accounts where there was data available proved a useful way of gaining understanding of the concepts, data sources and methods needed for NCA.

A key challenge is to develop the capacity to interpret and use the accounts in government decision-making. At present the accounts are not well known in the analytical or policy community, although several potential partnerships were identified and in particular within specialist areas of NEDA and the Philippines Institute of Development Studies and the LLDA has received requests from academics for information. Importantly, there is capacity within government to use the accounts in, for example, sophisticated tools like input-output and computable general equilibrium modeling. Better linking of the accounts to policy options (for example, user pays, polluter pays) and analytical tools will also address this challenge.

For NCA to progress to the next level in the Philippines will require strong leadership and a concerted effort to manage and monitor the processes established beyond WAVES. For this to occur communication to senior policy makers and decision-makers needs to be clearer. The reports in production are

highly technical and the technical working groups need to develop summary indicators and become better at conveying essential information in easy to understand ways.

6.9 The Way Forward for WAVES in Philippines

A long-term roadmap for NCA in the Philippines beyond WAVES will be developed in the final year of implementation. It is recommended that the roadmap includes:

- Management arrangements and organizational structure for both production and use of the accounts, identifying priorities, suppliers of data, producers of accounts, and users of accounts;
- Prioritized list of additional accounts to be developed;
- Schedule for accounts production and processes for this, as well as schedule for delivery of policy analysis; as much as possible timed to be useful in policy processes; and
- Specification of products (accounts tables, indicators), publication schedule and review process.

A key for any account produced or put into regular production will be to make it available to the public and in formats whereby analysts and users can easily make use of the information in the accounts.

An operational structure and process for on-going strategic direction is needed along with ways to better connect with the analysis and policy use of the accounts. These are needed in addition to those established for the production of the accounts. This can be guided by:

- The lessons from WAVES to define and prioritize what accounts (at what scales) can realistically be put into regular production and what measures and resources are required to do this;
- Identify the processes for the analysis of data and who and what institutions will conduct or engage in the analysis of data and accounts; and
- Identify relevant policy processes as entry points linking the production with the demand/use of accounts.

7. Lessons and the Way Forward

7.1 Introduction

Natural capital accounting is primarily about building long-term platform for organizing data that can serve a range of information needs for public administration, management and decision-making. It is about developing and putting in place long-term capacity in countries to manage their natural capital and natural resources for long-term growth and to understand the economic implications of trade-offs involving in using natural capital and distributing the benefits that arise from its use.

The lessons from the First 5 Core Implementing Countries have provided information for planning the next phase of WAVES – WAVES+. This section builds on material in the summary on the key lessons and the way forward presented earlier. Indications of the types of support that may be provided to the First 5 as part of WAVES+ were also included in the relevant country sections.

A key overall observation was that the development and use of natural capital was seen as a sequence, starting with the identification of priority issues, mapping these to the appropriate accounts, development of the accounts and application of accounts back to the issues policies. The initial identification of issues and the mapping of these to accounts were done well in all countries. However, account production was slow and meant that the loop back to the issues was not completed. It is now recognized that what is needed is a model where account production and policy engagement proceed in parallel.

The material that follows look at two aspects of natural capital accounting: producing accounts (which took most of the focus of the first phase of WAVES) and policy impact, which needs to be elevated in priority in WAVES+.

7.2 Lessons for Account Production

When beginning NCA a more pragmatic approach is needed, with a work plan covering an extended period (3-5 years). It is essential that the plan is based on the systematic analysis of past efforts and their shortcomings, not just of NCA but also of related areas such environmental information systems, the development of national accounts and the use of information in public policy.

The focus of the work plan should be on an accounts production process: data identification, data collection or compilation, estimation, editing, data quality assessment, sign-off and revision policy. Clear milestones are required for the production schedule and a management regime in place to ensure that the schedule is met. In this data quality needs to focus less on accuracy and more on relevance, timeliness, interpretability and accessibility.

As part of this, templates for the deliverables should be defined well in advance and users provided the opportunity to comment on the design of the deliverables.

So far institutionalization in countries has mostly meant setting up units for account production. This is necessary but not sufficient to ensure their on-going, efficient production and their use in policy. In particular, collaborative arrangements for data sharing need to be in place and time needs to be devoted to building teams with a range of skills and knowledge needed for account production. Units within particular agencies tend to be dominated by the professions within them (statistical agencies by statisticians, physical science agencies by scientists, planning and development agencies by economists, etc.). NCA requires a multidisciplinary approach and cooperation between many professions and agencies. Each have their own particular way of doing things and do not immediately understand the perspective of others.

Deeper understanding between agencies and professions requires greater clarity on concepts and terminology, especially for ecosystem accounting which is new and for which international standards are not yet in place. Related to this was a problem evident in many countries of not understanding the content, overlaps and differences between the System of National Accounts, SEEA Central Framework and SEEA Experimental Ecosystem Accounts. All contain elements of NCA. For example, the System of National Accounts contains national balance sheets that include a large part of natural capital (where it is called “non-produced capital”).

Closer engagement with national accounts will also help NCA implementation in countries. While the balance sheet is the obvious entry point, as several countries have found, disaggregation of industries and sectors can help. For example, the separation of the agricultural, forestry and fishing industries that are usually presented together as one bundle in the national accounts. Subnational estimates of the main SNA aggregates (for example, Output, GDP) as well as industry data (for example, agriculture, forestry, fishing, mining, water supply, sewerage, energy) are also possible (for example, it is done in Indonesia). If done, this would more easily enable scaling-down of information from national accounts to subnational levels, the scale where most ecosystem accounting work has been done. It may also help with scaling-up subnational ecosystem accounts to the country level. In addition, the processes and systems used to produce the national accounts provide a model for the production of NCA.

Capacity building

Lack of NCA expertise is a critical issue. At present the number of people with high-level skills available to provide advice and assistance to countries is limited. Ways to overcome this are needed. A switch in focus from short-term training to professional development and integration with the higher education institutions will assist this. Targeted development of young professions could be part of this.

In addition, the capacity development needs to extend beyond the theoretical knowledge of the accounts and further into the practical process of account production. There are several aspects to this: technical, administrative, communications, managerial. A particular expertise lacking is using the accounts in higher-level analytical work and more generally in public policy.

7.3 Lessons for Policy Impact

While there is significant conceptual acceptance of NCA and an ambition to use it instrumentally (for example, the accounts indicate a problem as well as point to a potential solution), actual use is difficult to demonstrate. To some degree, NCA has been included in the development plans of all countries but its application to issues has so far been limited. A range of opportunities to apply the accounts has been identified in countries (Sustainable Development Goals, Green Economy, sector reform in natural resource management) this needs to be supported at the regional and global level

There is a need to more systematically identify and target strategic entry points for accounts. These targets should then be a focus for managing the production process, and in particular for meeting the milestones and deliverables of that process. For example, the mining reform and fiscal regime in Philippines can be addressed in the next year and deliverables should be produced for use in this process. If these are not produced in time (i.e. production milestones are missed), then a major opportunity to show the utility of the accounts is lost.

In the future better integration of account production with policy is needed. This is not just identifying the issues, but the institution(s) and the specific people doing the analyses and the particular tools they are using to determine possible policy options. For example, tailoring accounts for scenario analysis or to test the possible impact of different policy options. This also extends to accounts as input to developing extended input-output tables, Social Accounting Matrices and Computable General Equilibrium models.

Also needed is a greater understanding of how NCA accounts can help at a more basic level. For example, understanding of economy-wide impacts of different policies or decisions, such as the implications of variable water pricing across different industries or of moving to a low carbon economy. This related to the issue of the development and communication of appropriate indicators.

7.4 Lessons for WAVES+

WAVES+ has three components: country, regional and global. In addition, the ambition is to add new countries and the criteria used to select countries in the first phase will be updated to reflect the experience to date.

Though final decisions are yet to be made with respect to providing continued support to the First 5, it is probable that WAVES+ will include low-intensity support for these countries.

For the First 5, the general type of support from WAVES+ could include:

1. **Policy links:** This would have two aspects. Firstly, taking the accounts produced and applying them to particular issues, policy instruments or analytical techniques. Secondly, helping to design and apply a process for linking NCA to accounting, building on existing institutions and coordination mechanisms as appropriate
2. **Institutionalization activities:** For example, account production process, including data management, templates for accounts, data quality assessment)
3. **Capacity building:** This will be largely done via the regional component. Targeted assistance may also be provided for key issues (such as policy linkage and institutionalization).

For new countries, account production needs to take greater consideration of the timeliness of information—that is the information needed to be available when particular decisions were being made. Several opportunities were identified for informing specific decisions in the first phase, but accounts were not ready in time for use in these decisions. In this it was apparent that the dimensions of data quality most important to account producers were accuracy and coherence (adherence to standards), while decision makers were more interested in relevance, accessibility, timeliness and interpretability.

What is needed are:

1. Better initial identification of who is making decisions, when are they making decisions and where are decision makers obtaining advice (identification of issues is not enough).
2. An ongoing process of engagement with the analytical and policy communities.
3. A greater focus on account production as an ongoing process and taking advantage of existing information and data coordination mechanisms.
4. Stronger links to national accounting.

The first can be added to the initial start-up work of countries and the second requires the establishment of a parallel process for connecting policy to accounts as well as a better articulation of how accounts can be used by the policy and analytical communities. The third and fourth on production and linking to national accounting were covered in the work to date. Going forward there needs to be a greater emphasis on these and key is ensuring middle managers are able to understand sufficiently the technical work to effectively monitor progress and can make the necessary links to the national accounting, physical science, analytical and policy communities.



Wealth Accounting and the Valuation of Ecosystem Services (WAVES) is a global partnership led by the World Bank that aims to promote sustainable development by ensuring that natural resources are mainstreamed in development planning and national economic accounts.

www.wavespartnership.org