



Ministerio del
Medio
Ambiente

Gobierno de Chile

CHILE'S NATIONAL ENVIRONMENTAL ACCOUNTS PLAN

Division of Information
and Environmental Economics



CHILE'S NATIONAL ENVIRONMENTAL ACCOUNTS PLAN

**DIVISION OF INFORMATION
AND ENVIRONMENTAL ECONOMICS**

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ISBN: 978-956-7204-60-1
December 2016

PRESENTATION

As with other developing nations, Chile still has important challenges regarding the environment; amongst the most urgent are air pollution, as well as water and soil contamination, the efficient management of waste, and the protection of biodiversity and ecosystems.

Furthermore, Chile's economic growth is largely based on the use of its natural resources, such as copper mining, forestry and fisheries, therefore, protecting our natural capital and the ecosystem services it provides is crucial.

Sustainable development therefore is not only a necessity but also an ethical and social imperative, since vulnerable communities are generally the most affected by pollution and, for this reason, environmental equity constitutes the central focus of our effort and vision in the Government of President Michelle Bachelet.

Without detailed and systematic information regarding the environment and its relationship with the economic system, it is not possible to carry out effective environmental management. For this reason, Chile has gradually developed environmental indicators, acknowledging that they constitute key instruments to evaluate and monitor the pressures on the environment, its status, quality, and the impacts on people's quality of life.

However, environmental indicators are insufficient to adequately reflect the relationship between the environment and ecosystems and the economic system. To this end, a comprehensive economic environmental information system is needed. The economic environmental accounts system enables the relationship between the economic system and its effect on the natural capital, so as to have a more precise vision of economic development and facilitate the construction of indicators to support public policy.

The Ministry of the Environment (MMA, for its acronym in Spanish) holds various legal obligations and international commitments regarding indicators and environmental accounts, considered explicitly in the Government Program of President Michelle Bachelet. The Ministry of the Environment, through its Division of Information and Environmental Economics has taken on the challenge of designing and implementing an Environmental Accounts System and, to that end, presents a Strategic Plan for its implementation.

The proposal of the National Environmental Accounts Plan, detailed in this document, constitutes an institutional effort to integrate the environmental economic information in order to render account of our economic development. It is also the result of a multidisciplinary team in the Ministry of the Environment and United Nations experts who have gathered international experiences regarding this matter, and who have evaluated our institutional reality to make a comprehensive proposal which includes multiple consultations with all the relevant public services and institutions.

We hope that this proposal becomes an integral part of the environmental institutional system, while at the same time, providing a key contribution to the effort we put forth as a Government -and as a country- to promote a more sustainable economic development.



Pablo Badenier Martínez
Minister of the Environment

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EXECUTIVE SUMMARY

Chile's economic development is based on the exploitation and intensive use of natural resources. This generates a significant impact on the environment and people's quality of life. Therefore, coherent and consistent environmental information is not only relevant for the effective monitoring of the state and use of natural resources and ecosystems, but also to inform an increasingly aware population of their rights with respect to the country's environmental issues.

In this context, Chile has advanced in the construction and development of environmental indicators. However, these do not thoroughly reflect the relationship between environmental variables and the economic system. The development of comprehensive economic-environmental accounts helps connect the economic system with its impact on natural capital so as to have a more precise view of the development strategy as well as supporting public policy.

The Ministry of the Environment (MMA) is responsible for several legal obligations and international commitments regarding indicators and environmental accounts. In addition, their development corresponds to an explicit commitment of the Government of President Michelle Bachelet. Therefore, the Government of Chile, through the Ministry of the Environment, has taken on the challenge of designing and implementing a comprehensive system of Environmental, Ecosystem, and Economic Accounts (SICAEE, for its acronym in Spanish) for Chile and in this document presents a Strategic Plan for its implementation. The objectives of the Plan are:

- 1 Build and validate an institutional framework that effectively manages an Integrated System of Environmental, Ecosystem, and Economic Accounts (SICAEE).
- 2 Construct a conceptually coherent information system through economic-environmental accounting that responds to the needs of the sectorial strategies and the national and international demands regarding information and environmental indicators.
- 3 Place environmental quantification and statistics as an unavoidable protagonist of public policies in the different ministerial programs that are related with the environment, agriculture, fishing, energy, public works, transportation, national patrimony, housing and urbanism, and social development, among others.
- 4 Contribute to the Sustainable Development Goals (SDG) regarding environmental quantification in the United Nations Statistical Program and to the commitments with international organizations such as the OECD, European Union, United Nations, and CBD, among others.

- 5 Provide information technology solutions that provide timely, efficient, and standardized services and solutions, taking advantage of the availability of information technology and of the professional resources of the Ministry of the Environment, such as documentation standards, technology, and security standards to decrease operational and technological risks.
- 6 Develop and publish prioritized sectoral environmental accounts, and promote the creation of relevant environmental accounts for other Government Agencies through technical support provided by the Division of Information and Environmental Economics.

Recognizing Chile's environmental institutional system as well as the decentralized nature of the collection of basic statistics, the National Environmental Accounts Plan is based on a second-tier proposal for institutional structure. That is, it leaves the responsibility of collecting and systematizing environmental statistics to the Government Agencies, including the creation of sectoral environmental accounts, but delegating responsibility of coordinating, training, and integrating the environmental accounts to the Ministry of the Environment through the SICAE.

The institutional proposal places strategic responsibilities for the development of the Environmental Accounts System on the Ministry of the Environment, supported by the Council of Ministers for Sustainability. It also proposes the creation of an Interinstitutional Committee for Information and Environmental Accounts, as the coordinating structure for the development and implementation of Environmental Accounts. In addition, an Environmental Accounts Unit should be created in the Ministry of the Environment as an executing body that is responsible for integrating the system, generating institutional capacities, and providing the data infrastructure for the implementation of the accounts.

At the same time, the Ministry of the Environment commits, with its own resources, to the development of four preliminary pilot accounts, and invites Government Agencies to develop their own accounts through the Interinstitutional Committee for Information and Environmental Accounts, with the support of the Department of Environmental Accounts.

This four-part document develops the proposal through a National Environmental Accounts Plan (Plan). The first two chapters present the necessary background to adequately contextualize and justify the Plan's proposal addressed in Chapters 3 and 4.

The first chapter is an introduction that presents the global and national logic behind the implementation of an integrated economic and environmental accounting system, also including the general objectives of the Accounts Plan. The second chapter presents an institutional assessment of Chile and the current

institutional structure for the collection of environmental statistics. Chapter 3 presents the proposal for a multidimensional structure that supports the Plan. This is the SICAE and its five dimensions: conceptual framework, institutional framework, data model, process model, and data infrastructure. Finally, Chapter 4 presents the Work Plan for the next three years.

This Plan was developed in the Division of Information and Environmental Economics of the Ministry of the Environment. However, its creation included the valuable contribution of a series of national and international experts in the framework of the project “*Impulso a la Contabilidad Experimental de Ecosistemas del Sistema de Cuentas Ambiental y Económica (SCAE)*” (Promotion of the Experimental Accounting of Ecosystems of the Environmental and Economic Accounts System), led by the United Nations Division of Statistics. The objective of the Project is to develop a working program based on national policy priorities, the existing institutional structure, the availability of data, and measurement practices. In this context, the contribution of national consultants José Venegas (main consultant), Paola Vasconi, Patricio Pliscoff and Felipe Vásquez is appreciated. At the same time, the contribution of the team of the United Nations Division of Statistics is also appreciated, particularly, Alessandra Alfieri, Mark Eigenraam, Emil Ivanov, and Leila Rohd-Thomsen. Thanks are also due for the observations and comments made by the Ministry of Economy, Development, and Tourism, the Ministry of Agriculture, Ministry of Housing and Urban Planning, the Central Bank, and the Economic Commission for Latin America and the Caribbean (ECLAC).

1. INTRODUCTION

1.1 The Problem

There is no doubt that at both a global and local level, human activity is altering the environment (Ma, 2005; Rockstrom, 2009; TEEB, 2010; Cardinale et al., 2012). This has translated into increasing demands from citizens for specific actions from Governments and international agencies to respond to these enormous challenges (Rio+20, Post-2015 Development Agenda). However, one of the barriers for appropriate responses to environmental issues is the absence of comprehensive and accepted information regarding the interrelationship between society and nature.

Currently there is considerable information in the economic and social sphere, but with respect to the environmental dimension, information is scarce, poorly developed, and fragmented. When there is scientific information, it does not cross-over to different disciplines, and many times it is not feasible to aggregate to the national or global level. Furthermore, the environmental information that is collected is produced with different methodologies and definitions, and what is even worse it does not consider the interaction of the environment with human activity and the economic system. Given these characteristics, it is not surprising that, with respect to the environment, the public and academic debate is fragmented, disconnected, and without a clear direction. Consequently, it is essential to develop methodologies, concepts, and systems that integrate the economic and environmental information.

1.2 Global Perspective

At an international level there are concerns regarding the absence of adequate information for the needs of environmental management, as well as greater awareness of the need to advance toward integrated economic-environmental information systems. In 2013, the Report of the High Level Panel of Eminent Persons regarding the Post 2015 Development Agenda, called for a revolution in the statistics for sustainable development with a new international initiative to improve the quality of statistics and information available for the citizenry¹. The Report highlights that statistics and indicators must support Governments to evaluate their policies and ensure that decisions are based on evidence. It also points out that the information systems constitute key elements for public accountability and decision making, and that Governments should adopt the System of Economic-Environmental Accounting proposed by the United Nations to advance in this task.

In that same year, the document “Guidelines on Integrated Statistics” (United Nations, 2013) was published, reiterating the need to advance toward integrated statistical systems that entails a reform of the institutional structures for the collection of primary information. The Report recognizes the importance of a comprehensive perspective, in order to improve the consistency and coherence of economic statistics, thus strengthening the quality and analytical value of the information contained in the statistics. Finally, the Guideline presents a comprehensive framework of economic statistics based on best practices for the complete spectrum of statistical Agencies, including countries with different development levels and different management systems for the production of statistics.

¹ *A New Global Partnership: Eradicate Poverty and Transform Economies through Sustainable Development*

In 2014, the Independent Expert Advisory Group on a Data Revolution for Sustainable Development (IEAG) called to improve the coordination between statistical programs developed by the different international organizations². The recent *Synthesis* Report, published by the Secretary General of the United Nations, underscored the IEAG recommendation, stating that ‘building statistical capacity’ is a central part of the new investments for development.

1.3 National Perspective

The Chilean economy is based primarily on the exploitation and intensive use of natural resources, and on productive processes that have a high impact on the environment and people’s quality of life. In this context, environmental information emerges not only as a key instrument to evaluate and monitor the development strategy, but also as an essential tool for an increasingly aware citizenry regarding the country’s environmental reality, exercising their rights to information and participation.

With this in mind, Chile has recognized the importance of having data that allows for the recognition, monitoring, and prevention of environmental problems and conflicts, developing specific regulatory frameworks that establish the generation and public use of information regarding the environment.

The Ministry of the Environment (MMA) has various legal obligations and international commitments regarding indicators and environmental accounts. The *Ley de Bases Generales del Medio Ambiente* (Environmental General Basic Law)³ states that the MMA must publish reports regarding the state of the environment every four years at a national, regional, and local level, and an annual consolidated report about the state of the environment at a national and regional level. These reports are documents based on environmental indicators under the conceptual framework of UNEP’s Driving Force, Pressure, State, Impact, and Response.

The development of environmental accounts is also a part of the legal functions of the MMA⁴, in addition to a commitment that the country acquired with the OECD⁵ and, more recently, Chile’s adherence to the 2020 goals of the Convention on Biological Diversity, known as the Aichi Goals, that call for the integration of the values of biological diversity in the national accounting systems and to a better understanding of its status and trends. It is also necessary to point out that the development of the environmental accounts is an explicit commitment of the Government Program of President Michelle Bachelet⁶.

In addition, Chile has acquired a series of commitments regarding environmental information related with different global initiatives, such as: the development of environmental indicators regarding the “Green Economy” (Indicators of Green Economy, IEV, for its acronym in Spanish) of the United Nations Environmental Program (UNEP) (UN, 2014); the project “Green Growth” of the Organization for Economic Cooperation and Development (OECD); the initiative “Beyond GDP” of the European Union; and the efforts initiated under the framework of the Convention on Biological Diversity (CBD). By having structured economic-environmental information, the System of Environmental and Economic Accounts (SEEA) promotes and facilitates the development of this type of indicators.

² *A World that counts - mobilizing the data revolution for sustainable development* <http://www.undatarevolution.org/>

³ “Ley 19,300 sobre Bases Generales del Medio Ambiente” (<http://www.leychile.cl/Navegar?idNormal=30667>) modified by Law 20,417, which creates the Ministry, the Environmental Evaluation Service, and the Superintendency of the Environment (<http://www.leychile.cl/Navegar?idNorma=1010459>), Article 70 letter ñ.

⁴ Law 19,300 modified by Law 20,417 which “Creates the Ministry, the Environmental Evaluation Service, and the Superintendency of the Environment” establishes in its Article 70 letter “k” that it is the responsibility especially of the Ministry to “Develop the necessary studies and gather all the available information to determine the country’s environmental base line, develop environmental accounts, including the environmental assets and liabilities, and the loading capacity of the different environmental basins in the country.”

⁵ Chile made a commitment before the Organization for Economic Cooperation and Development (OECD) to develop the national environmental accounts by virtue of its recommendations regarding flow registries of materials and resource productivity C(2004)79 and C(2008)40.

⁶ The Government Program of President Michelle Bachelet for the 2014/2018 period establishes in the Environmental Section that “We will advance in a National Plan of Environmental Accounts so that the Ministry of the Environment, through the authorities granted to it, may coordinate the progressive development and construction of environmental accounts including environmental assets and liabilities and the loading capacity of the different environmental basins in the country”.

BOX 1.1: ENVIRONMENTAL POLICY INITIATIVES THAT REQUIRE MORE INFORMATION

- **Biodiversity and Protected Areas Agency:** Currently under discussion in Congress, the objective of this new Agency is the conservation of the country's biological diversity through the preservation, restoration, and sustainable use of the species and ecosystems. Among the relevant functions of the Agency regarding environmental information is the implementation of monitoring networks to determine the state of conservation of biodiversity and the development and management of inventories of species and ecosystems.
- **Biodiversity Strategy:** Its purpose is to preserve the country's biodiversity by promoting its sustainable management to safe keep its vital capacity, and guarantee access to its benefits for the wellbeing of current and future generations. At a national level there is a National Biodiversity Strategy whose counterparts at a regional level are the regional biodiversity strategies. This strategy requires comprehensive information and indicators for its monitoring.
- **The Green Growth Strategy:** In May of 2010, Chile reiterated its commitment with the OECD's Green Growth Strategy, for which the Ministries of Finance and of the Environment jointly developed a Green Growth Strategy for Chile. The objective of the Strategy is to promote economic growth while at the same time contribute to the protection of the environment, the creation of green employment, and social equity. With respect to environmental information, the Strategy considers a set of indicators for appropriate monitoring of public policies, structured in three thematic areas: green growth, citizens' environmental behavior, and wellbeing of environmental policies.
- **National Plan for Adaptation to Climate Change:** This plan provides the conceptual framework and guidelines for the national measures to adapt to climate change, in addition to coordinating sectorial adaptation plans involved in the National Plan for Adaptation to Climate Change⁷, for the sectors which have been defined as priorities. The development of these adaptation plans will demand a significant amount of environmental information.
- **National Sustainable Consumption and Production Program:** In March 2016 the MMA launched a National Sustainable Consumption and Production Program. The Program will address 12 lines of action for the next 10 years, including its general objectives, specific objectives, working areas, its main initiatives and tools, as well as the relevant actors identified and their proposed roles. The monitoring of the Program will require new information systems and economic-environmental indicators.
- **Environmental Impact Assessment System:** The reform to the environmental impact evaluation system is currently under discussion. To this effect, a Presidential Commission was created with the objective of analyzing the structure, procedures, mechanism, and tools linked to the SEIA, and evaluating adjustments consistent with the current demands, to increase its effectiveness and reliability, and strengthen it as a preventive instrument for environmental management. It is made up of representatives from non-governmental organizations, academic world, industry, professional associations, environmental consultants, and representatives from the members of the Committee of Ministers. There is no doubt that the reform to be implemented will require new instruments that integrate environmental and economic information.

⁷ http://www.mma.gob.cl/1304/articles-49744_plan_01.pdf

In addition to the international requirements for information there are also current legal obligations of environmental management that demand information at the national, regional, and local levels. These demands are pressuring the national statistics system which now can only respond in an insufficient and disjointed manner to the information regarding public management of the environment. Moreover, there are public policy initiatives that will increasingly demand greater development of the statistical systems for environmental issues.

In this context, the development needs of environmental and ecosystem accounts as well as the different demands for information may not be addressed separately. These requirements must be addressed as part of the series of demands for more environmental information. Thus, the working program for environmental and ecosystem accounts is included within a strategic plan for comprehensive development.

1.4 Objectives of the Accounts Plan

The System of National Accounts (SNA, UN, 2008) is the primary macroeconomic accounting system to guide public policy, and from where the main economic indicators emerge, such as the Gross Domestic Product. However, it does not include the capital loss associated with environmental impacts and, consequently, provides a limited perception of the national economic development, which is especially relevant for a country that bases its economic development on its natural resources. For this reason, complementary accounting systems have been developed.

The System of Environmental and Economic Accounts (SEEA, UN, 2012) is a second generation system of satellite accounts that includes the environment. It includes an account of the productive natural capital (environmental assets) and its change over time, expanding the central framework of the System of National Accounts. In addition, the United Nations aims to build a third generation system that considers ecosystems. The so called Experimental Ecosystem Accounts of the SEEA (SEEA-EEA, UN 2012) incorporates ecosystems as part of the national accounting system. The Experimental Accounts do not provide precise recommendations on how to compile ecosystem accounts but they constitute a starting point for the future development of a global system.

Both the SEEA and the Experimental Ecosystem Accounts (EEA) use concepts, structures, rules, and principles of the National Accounts System. Together, these methodologies have the potential to fully describe the relationship between the economy, human activity, and the environment.

The development of a system of environment and ecosystem accounts may not be addressed separately. It must be conceived as part of the series of demands for more environmental information. Thus, the working program for the development of environmental and ecosystem accounts proposed below, is included within a strategic plan for the development of a comprehensive system of environmental, ecosystem, and economic accounts (SEEA) for Chile, that gradually adopts the recommendations of the United Nations regarding environmental information, achieving the integration of the different accounting frameworks.

Specifically, the following medium term strategic objectives are proposed:

- 1 Develop and validate an institutional framework that effectively manages a Comprehensive System of Environmental, Ecosystem, and Economic Accounts (SICAEE).
- 2 Develop an information system that is conceptually coherent through economic-environmental accounting that responds to the requirements of the sectoral strategies and the national and international demands regarding environmental information and indicators.
- 3 Place the environmental measurements and statistics as unavoidable protagonists of public policies in the different ministerial programs related with the environment: agriculture, fishing, energy, public works, transportation, national assets, housing and urbanism, and social development, among others.
- 4 Contribute to the Sustainable Development Goals (SDG) with respect to environmental measurements in the Statistics Program of the United Nations, and to the commitments with international organizations such as the OECD, European Union, and CBD, among others.
- 5 Provide information technology solutions that render timely and standardized services and solutions, taking advantage of the availability of information technology and the professional resources of the Ministry of the Environment, such as applying the documentation, technology, and security standard regulations to reduce operational and technological risks.
- 6 Develop and publish priority sectorial environmental accounts, and promote the development of relevant environmental accounts for other government services through the technical support of the Division of Information and Environmental Economics.

Following is a diagnosis of our environmental institutional system and collection of basic statistics (Chapter 2). Considering this background, a structural proposal is presented for the development of a Comprehensive System of Environmental, Ecosystem, and Economic Accounts (SICAE) (Chapter 3), and a work plan for the next three years (Chapter 4).

2. INSTITUTIONAL ASSESSMENT OF CHILE

2.1 The Institutional Structure of the Environmental System

The environmental institutional structure and the responsibilities of the competent Government Agencies are regulated by the *Ley de Bases del Medio Ambiente* (Environmental Bases Law), Law 19,300, which creates the institutional framework and instruments for environmental management, and Law 20,417 which creates the Ministry of the Environment (MMA) and its dependent Agencies.⁸ These have a series of responsibilities and powers related to the management and administration of environmental policies. However, they do not address all of the Government's actions on environmental policy, rather the State's environmental policy is executed through an institutional system that involves several public Agencies.

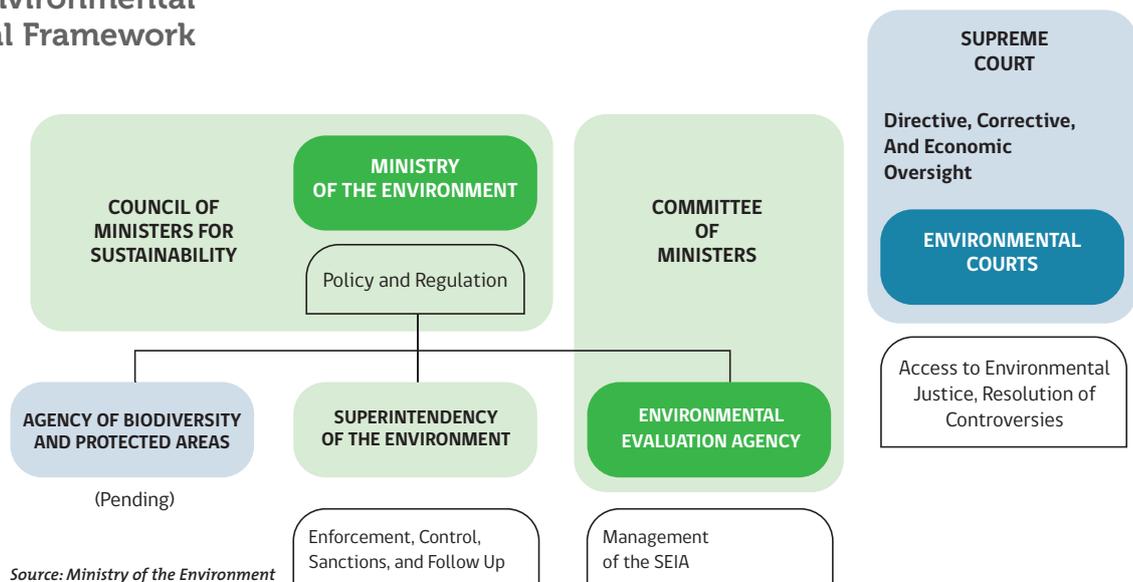
Chile's environmental institutional system is characterized for being semi-centralized, where the responsibilities regarding environmental policies are divided between the Ministry of the Environment and different sectoral Agencies. For this reason, high level environmental policies are informed, debated, and coordinated by the Ministries that have responsibilities in the environmental areas. These make up the Council of Ministers for Sustainability, presided by the MMA that is responsible for the development and implementation of environmental policies.⁹

This institutional structure of shared and fragmented environmental responsibilities, means that different units within the Ministry of the Environment and across the different sectoral Ministries, with environmental responsibilities, collect environmental information and require the development of indicators to improve their management. This implies a significant coordinating effort by the Ministry of the Environment that, through the Division of Information and Environmental Economics, has responsibilities in matters related to the generation, access, analysis, and dissemination of environmental information including indicators and environmental accounts.

⁸ *The Environmental Evaluation Service and the Superintendency of the Environment.*

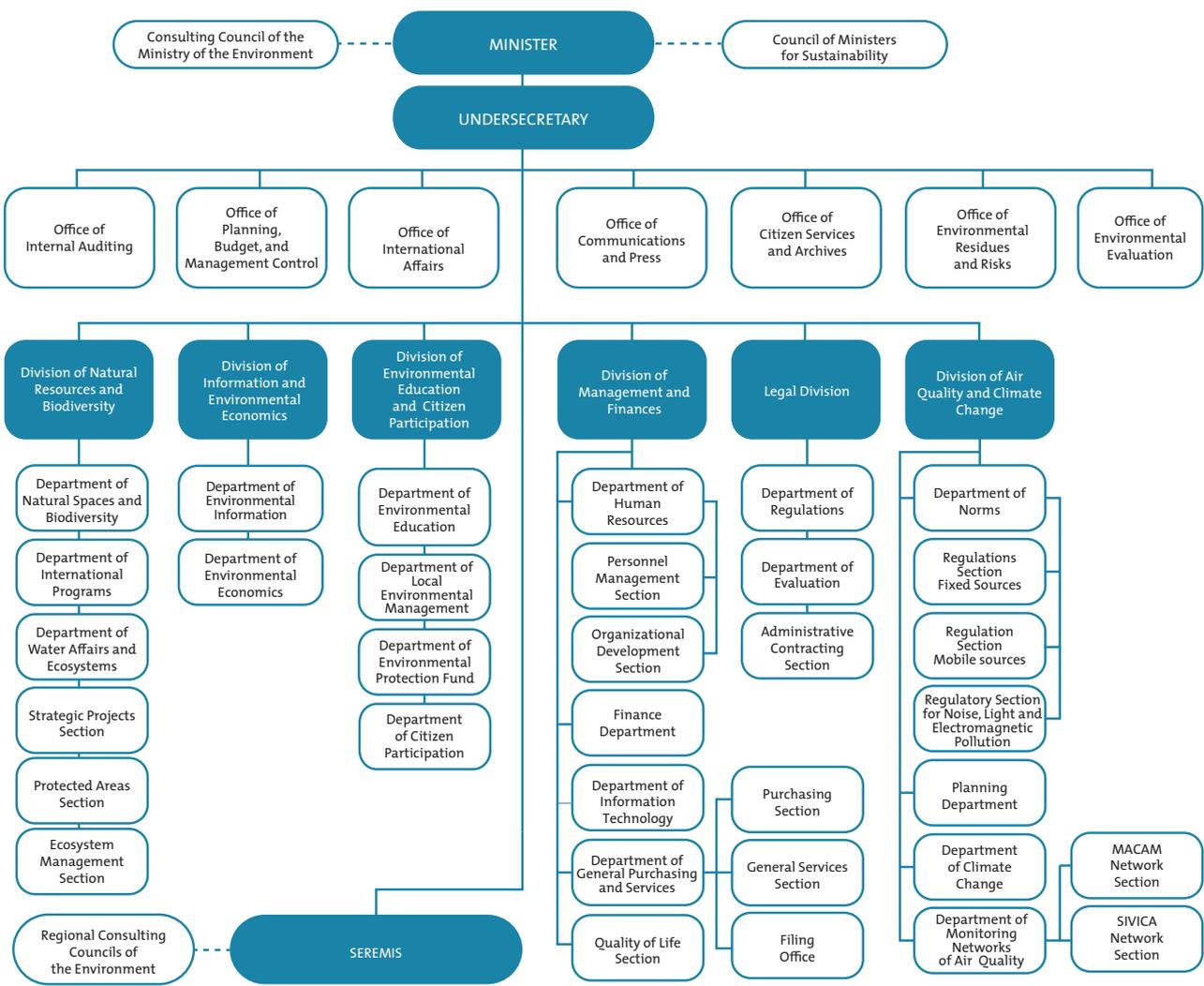
⁹ *The Council of Ministers for Sustainability is made up of the Minister of the Environment, Agriculture, Finance, Health, Economy, Development and Reconstruction, Energy, Public Works, Housing and Urbanism, Transportation and Telecommunications, Mining, and Social Development.*

Figure 2.1:
Environmental Institutional Framework



Source: Ministry of the Environment

Figure 2.2:
Organization of the Ministry of the Environment



Source: Ministry of the Environment

2.2 The Structure of Primary Statistical Collection

The institutions that make up the national statistical system of Chile are the National Statistics Institute (INE, for its acronym in Spanish), the Central Bank of Chile, and the Public Agencies that produce information. These institutions are coordinated through the National Council of Statistics headed by the INE. However, coordination is not always effective and in some cases, there is duplicity of efforts and, what is even more delicate, duplicity of information requirements from the companies, deteriorating the response rates of surveys or other statistical operations.

In the centralized statistical management models it is the national institutes of statistics that concentrate the responsibility of the production and development of statistics, as well as national accounting and other indicators. In the case of Chile, the system involves multiple actors and specialized agencies. It is considered a decentralized or fragmented institutional system for the management and development of statistics. Basic statistics are gathered in the sectoral Public Agencies, where the INE captures part of the information and develops some key surveys, but the Central Bank is responsible for developing the national accounts. In this same line, it is possible to observe that some specialized public Agencies are already developing sectoral satellite accounts, such is the case of the Under Secretary of Tourism and the Ministry of Health, which developed a satellite tourism and health account respectively.¹⁰ Using this logic, the Environmental Accounts should be coordinated by the Ministry of the Environment.

The generation of basic environmental statistics is also decentralized, as there are several public Agencies with environmental responsibility in charge of producing them.

Since 1986 the INE has published an annual report that compiles environmental statistics generated by around twenty public agencies, known as the The Annual Report on Environmental Statistics, which addresses a wide spectrum of environmental issues. However, this compilation does not satisfy the level of detailed information required in a timely manner for public policy, making it essential to coordinate and fulfill additional requirements through the environmental system.¹¹

2.2.1 Interinstitutional Committee for Environmental Information (CIIA, for its acronym in Spanish)

In order to satisfy the recent national and international demands for environmental information and indicators, in March of 2012 the Ministry of the Environment created the Interinstitutional Committee for Environmental Information (CIIA)¹². The CIIA is presided by the Head of the Division of Information and Environmental Economics of the MMA, and is made up of a number of institutions, including those that are a part of the Council of Ministers for Sustainability.

There are 47 State units, including institutes, divisions, and departments, belonging to the different ministries that participate in the provision of some kind of environmental information. The cross over between the ministries that make up the Council and the Committee is presented in Table 2.1. The CIIA also includes key organizations for the development of statistics and indicators such as the Central Bank and the National Institute of Statistics (INE).

¹⁰ <http://desal.minsal.cl/estadisticas/cuentas-de-salud/estadisticas/> <http://www.sernatur.cl/documentos/?category=27>

¹¹ http://www.ine.cl/canales/chile_estadistico/estadisticas_medio_ambiente/medio_ambiente.php

¹² Resolution No. 179 approved on March 15, 2012.

Among the ministries that participate in the Council of Ministers for Sustainability, the Ministry of Agriculture, Economy, Energy, and Finance contribute with 22 Agencies of the 47 units that produce information.

BOX 2.1: FUNCTIONS OF THE INTERINSTITUTIONAL COMMITTEE FOR ENVIRONMENTAL INFORMATION (CIIA)

- Provide and validate environmental information according to the requirements and objectives to be defined by the committee;
- Review and propose the policies and guidelines regarding environmental information;
- Show the environmental information deficiencies and gaps for the country's management and objectives, and propose and implement initiatives to cover said deficiencies;
- Ensure compliance with the defined guidelines, procedures, and mechanisms regarding environmental information;
- Propose and approve initiatives aimed at updating and improving the quality of environmental information, its effective recovery, and adequate processing.

**TABLE 2.1:
INTERINSTITUTIONAL SERVICES RESPONSIBLE FOR ENVIRONMENTAL INFORMATION**

		Council of Ministers for Sustainability													
		Environment	Agriculture	Finance	Health	Economy	Energy	Public Works	Housing and Urbanism	Transportation and Communications	Mining	Social Development	Non members of the Council	Total	
Interinstitutional Committee on Environmental Information	Ministries and other institutions														
	1 Ministry of the Environment (MMA)	1												1	
	2 Ministry of Agriculture		8											8	
	3 Ministry of Finance			4										4	
	4 Ministry of Health				2									2	
	5 Ministry of Economy, Development, and Tourism					5								5	
	6 Ministry of Energy						5							5	
	7 Ministry of Public Works							3						3	
	8 Ministry of Housing and Urbanism (MINVU)								1					1	
	9 Ministry of Transport. and Telecommunications									1				1	
	10 Ministry of Mining										1			1	
	11 Ministry of Social Development											1		1	
	12 Ministry of Defense												1	1	
	13 Ministry of Education (MINEDUC)												1	1	
	14 Ministry of National Assets												1	1	
	15 Ministry of the Interior and Public Security												3	3	
	16 Ministry of Foreign Relations												1	1	
	17 Ministry of Labor and Social Security												1	1	
	18 Chilean Copper Commission (COCHILCO)												1	1	
	19 Superintendence of the Environment (SMA)												1	1	
	20 Environmental Evaluation System (SEA)												1	1	
	21 Environmental SEREMIs												1	1	
	22 General Direction of Civil Aviation												1	1	
	23 Central Bank of Chile (BCCh)												1	1	
24 National Council for Clean Production (CPL)												1	1		
	Total	1	8	4	2	5	5	3	1	1	1	1	15	47	

Source: Own creation

2.2.2 Environmental Information Systems of the MMA

The MMA, through the Department of Environmental Information, has developed a series of activities and projects that constitute a base of knowledge for the future development of Environmental Accounts in Chile.

Among the most relevant initiatives that have been carried out or are being developed, are the following:

- Indicators for Reports and Briefings on the Status of the Environment.
- Indicators of the United Nations Development Objectives for the Millennium and the future Sustainable Development Objectives.
- OECD statistical questionnaires regarding the Status of the Environment.
- SPINCAM Project (Southeast Pacific Data and Information Network in support of Integrated Coastal Area Management).
- Indicators for the Green Growth Strategy and the Sustainable Consumption and Production Program.
- Environmental performance indicators of the productive sector (based on RETC data).
- Short-term environmental indicators.

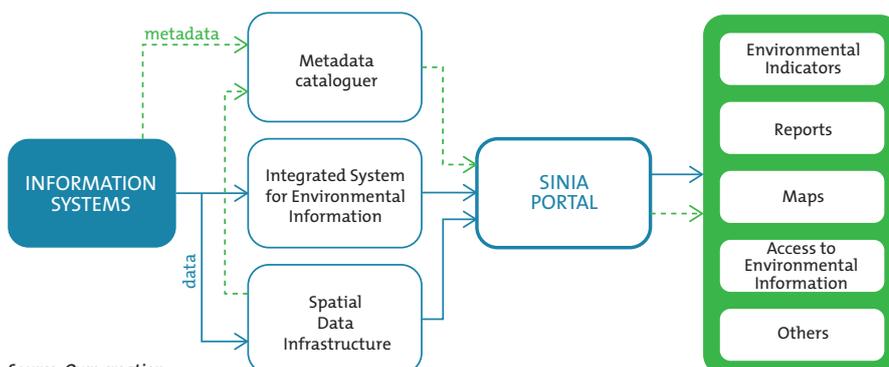
Since its creation in 2010, the MMA has been especially concerned with technology, consolidating an information platform that is conceptualized in the National System of Environmental Information (SINIA, for its acronym in Spanish) (Graph 3.3).

The SINIA is conceived as an environmental management tool that interconnects with other systems to facilitate access to environmental information by any person in a timely manner. In addition to accessing documentary information, it enables the capture, storage, generation, and publication of statistical information (for example, indicators, statistics, data) that will later be part of the MMA’s publications such as the Reports and Briefing on the Status of the Environment, maps, etc.

Following are the current most relevant information subsystems of the SINIA:

- Integrated System for Environmental Information (SIIA, for its acronym in Spanish)
- Spatial Data Infrastructure (IDE, for its acronym in Spanish)
- Data Provider Information Systems (ex.: RETC)

Figure 2.3:
National System of Environmental Information (SINIA)



Source: Own creation

¹³ <http://www.mma.gob.cl/1304/w3-article-52016.html>

¹⁴ <http://catalogador.mma.gob.cl:8080/resource/sinia/rema2013.pdf>

¹⁵ <http://www.sinia.cl/>

BOX 2.2: DATA SUBSYSTEM

The **Integrated System for Environmental Information (SIIA)** is an information system that allows for the capture and storage of data in a data warehouse, generates indicators (and soon environmental accounts) and publishes tables, graphs and metadata on the SINIA webpage (section 'indicators and statistics').¹⁶

Its objective is to gradually integrate all systems and store environmental data from different public Agencies (and other sources of information) and contribute to the production of indicators and environmental accounts, state of the environment reports, and other information products the responsibility of the MMA.

Spatial Data Infrastructure (IDE) is a system designed to access georeferenced information through a map service. Any user, without specialized knowledge, can access spatial data carry out analyses, and generate territorial indicators for the main environmental components. Its future projection is very promising. It is intended to incorporate the analysis of satellite images for the construction and permanent update of new indicators.¹⁷

There are several independent information systems, both at the MMA as well as in other public organizations which, through integration with the SIIA and IDE, are provided with data. It is expected that the number of entries in the diverse information systems will gradually increase.

Given the diversity and amount of information it has, the most relevant information system integrated to the SINIA for the development of environmental accounts, is the **Pollution Release and Transfer Registry (RETC)**, for its acronym in Spanish). The RETC is a database aimed at: capturing, compiling, systematizing, conserving, analyzing and disseminating information on emissions to the air and water, waste, and transfer of contaminants which are potentially harmful to health and the environment, generated in industrial and non-industrial activities.¹⁸

Additionally, the RETC Regulation (S.D. N°1/2013) establishes the implementation of the One Stop Window System as the only system of entry to the sectorial statements and reports systems. It also includes new responsibilities with respect to the management of non-dangerous waste and new information such as production and expenditures registries on environmental protection of reporting sources.

¹⁶ sija.mma.gob.cl/mma-centralizador-publico/inicio.jsf

¹⁷ <http://ide.mma.gob.cl>

¹⁸ www.retc.cl

3. THE INTEGRATED SYSTEM OF ENVIRONMENTAL, ECOSYSTEM, AND ECONOMIC ACCOUNTS (SICAEE, FOR ITS ACRONYM IN SPANISH)

3.1 Introduction

The System of Environmental Economic Accounts (SEEA) is a second generation system of satellite accounts that includes the environmental dimension. It incorporates an account of the natural productive capital (environmental assets) and its change over time, expanding the accounting approach of the System of National Accounts. Even though the SEEA is an important advance, its insufficient as it does not incorporate nature as a live agent of the economic system that provides well-being and services. For this reason, the United Nations is focused on building a third generation system that considers ecosystems. The so-called Experimental Ecosystems Accounts of the SEEA intend to fill this gap, incorporating ecosystems as part of the national accounting system.

The Ecosystem Experimental Accounts of the SEEA constitute a synthesis of the existing knowledge in this area, and may provide a starting point for the development of ecosystems accounting at a national or subnational level. The Experimental Accounts do not provide precise recommendations on how to compile ecosystem accounts, but constitute a starting point for the future development of a global system.

Both the SEEA and the Ecosystem Experimental Accounts use concepts, structures, rules, and principles of the System of National Accounts. Together, these methodologies have the potential to fully describe the relationship between the economy, human activity, and the environment.

The Integrated System of Environmental, Ecosystem, and Economic Accounts (SICAEE) is Chile's proposal for a comprehensive system of environmental information that incorporates the most recent recommendations of the United Nations, addressing both subsystems (SEEA and EEA), connected with the central framework of the system of national accounts (SNA). The SICAEE responds to the need to advance toward integrated systems for the production of statistics so as to respond to the increasing national and international demands for coherent and consistent environmental information, as well as integrated to the economic and social information.

The SICAEE's objective is to normalize, interrelate, coordinate, prioritize, select information entities, and provide gradual operational solutions to the series of requirements of the SEEA, EEA, and other environmental indicators that are necessary, for example, indicators of green economy or of sustainable development. The SICAEE receives and transforms the environmental accounting requirements based on an integrated data architecture. The accounting conceptual framework, which constitutes the starting point, is the system of national accounts.

The SICAEE must respond to the different phenomena that define the current development of public information systems. These include:

- 1 Information for public policy and management.
- 2 The increasing information requirements.
- 3 The requirements of information specialization.
- 4 Interconnected information networks.
- 5 Increasing normalization of information systems.

This decentralized scheme in the development of the accounts has several advantages, among which the following stand out:

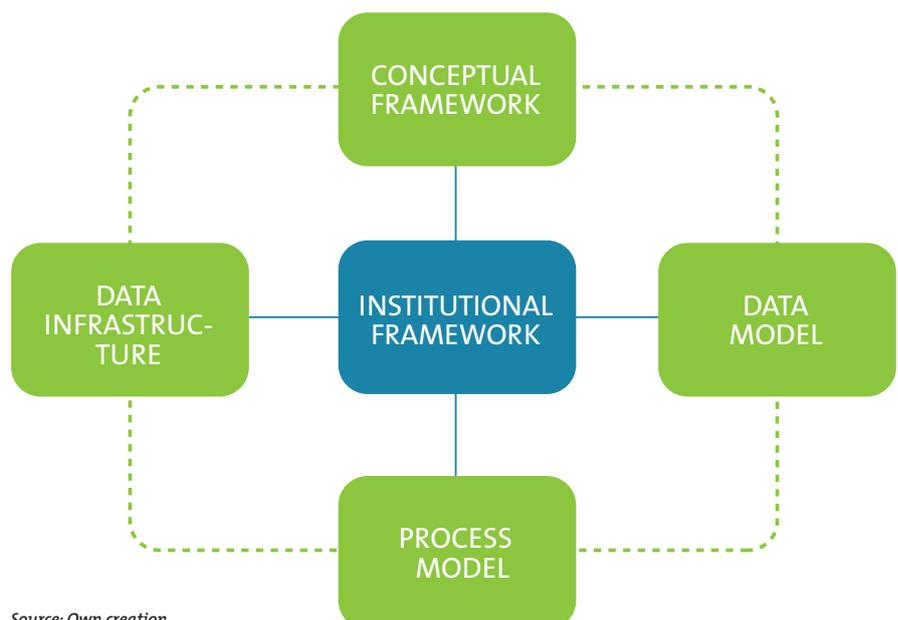
- 1 Convergence of information with policies and management in ministries.
- 2 Facilitating the coordination between the interdisciplinary tasks of professionals in sectorial areas statistical-accounting professionals.
- 3 More powerful focus on specialized statistical and accounting development.
- 4 Strengthening of the productive and coordinating role of the traditional public organizations regarding national statistics and accounting, as a result of the synergy of a multi-institutional integrated system.

This plan considers the SICAEE as a central system in the implementation of environmental accounts and indicators. Its basic role is the integration of the dozens of institutional components, information, models, and technologies that are present in the background of the environmental accounts and indicators.

The SICAEE is a system made up of five interrelated dimensions: conceptual framework, institutional framework, data model, process model, and data infrastructure. This means that any element of the information flow, or from any other environmental account or indicator, may be defined or determined within these five dimensions.

Following we present the dimension of SICAEE for Chile. The following chapter presents the work plan for the next three years.

Figure 3.1:
The 5 dimensions
of SICAEE



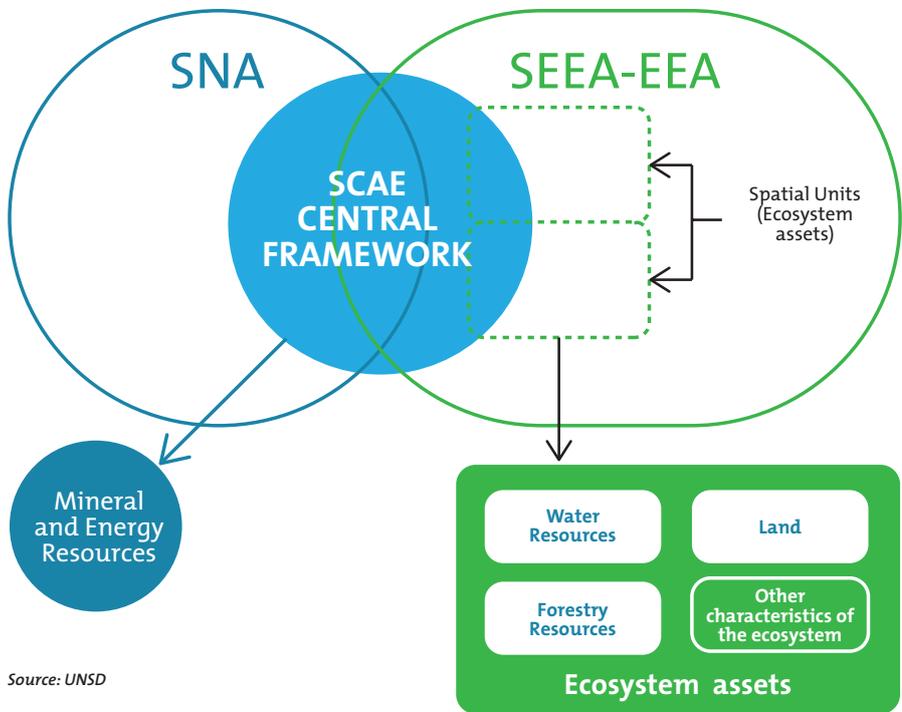
Source: Own creation

3.2 Conceptual framework

The SICAE suggests an integrated accounting framework, made up by three key statistical systems: the System of National Accounts (SNA), the System of Economic Environmental Accounts (SEEA), and the System of Ecosystem Experimental Accounts (SEEA-EEA).¹⁹

In its origin, the environmental accounts constitute a satellite extension of the System of National Accounts (SNA). The SNA is a system that restricts accounting to measurements within the market, government expenditure, and non-profit institutions. These measurements, which are also basis of firms accounting, are insufficient to address the long-term problems of a sustainable economy. Therefore, introducing the environmental extension to the economic accounts (SNA), generates a wider approach of the environmental and economic accounts system that originates the SEEA.²⁰ As the perspective of the SEEA is still insufficient because it addresses the stocks and flows of the environment as a whole, the System of Ecosystem Experimental Accounts (SEEA-CEE) was created, considering the environment as spatial units that make up ecosystems.

Jointly, the SNA, SEEA, and SEEA-EEA constitute a comprehensive way to measure the economy and the environment. While the SNA and the SEEA respond to information demands in public policy areas such as sustainable development, the complementary perspective of the SEEA-EEA informs on the provision of ecosystems services and their relationship with the economic system. This network of systems is shown in Figure 3.2.



Source: UNSD

Figure 3.2: Relationship between the SNA, SEEA and SEEA-EEA

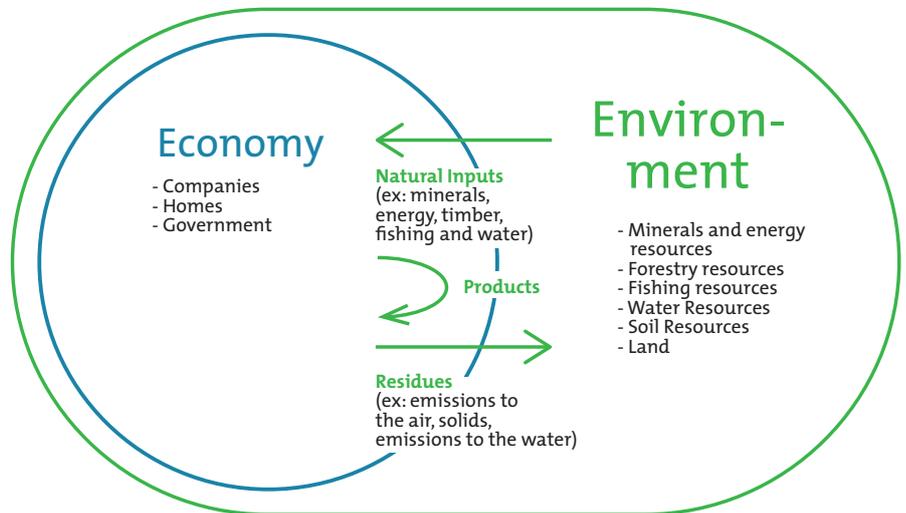
¹⁹ SNA, SEEA, SEEA-EEA Manual, UN.

²⁰ <http://www.cepal.org/cgi-bin/getProd.asp?xml=/deype/publicaciones/externas/1/49511/P49511.xml&xs1=/deype/tpl/p54f.xsl&base=/deype/tpl/top-bottom.xsl>

The SEEA Central Framework measures nation’s identifiable environmental assets, such as mineral, forestry and water resources, and their relationship with the economy, conceptualized as natural inputs, products, and waste. The SEEA-CEE, on the other hand, accounts for the system as a whole, considering interactions between individual assets in the context of spatially located ecosystems that provide ecosystem services, as well as other relevant considerations such as, altitude, climate, etc. In summary, the SEEA-EEA constitutes one of the ways in which to expand the SCN beyond the central framework.

The expansion of the environmental accounts to the limits of the SCN consists of, on the one hand, accounting for natural resources as an “active producer” of inputs to the economy and, on the other hand, as an “active consumer” of the emissions and waste. This producer-consumer role of the environment is shown in Figure 3.3.

Figure 3.3:
The flow of products in the SEEA

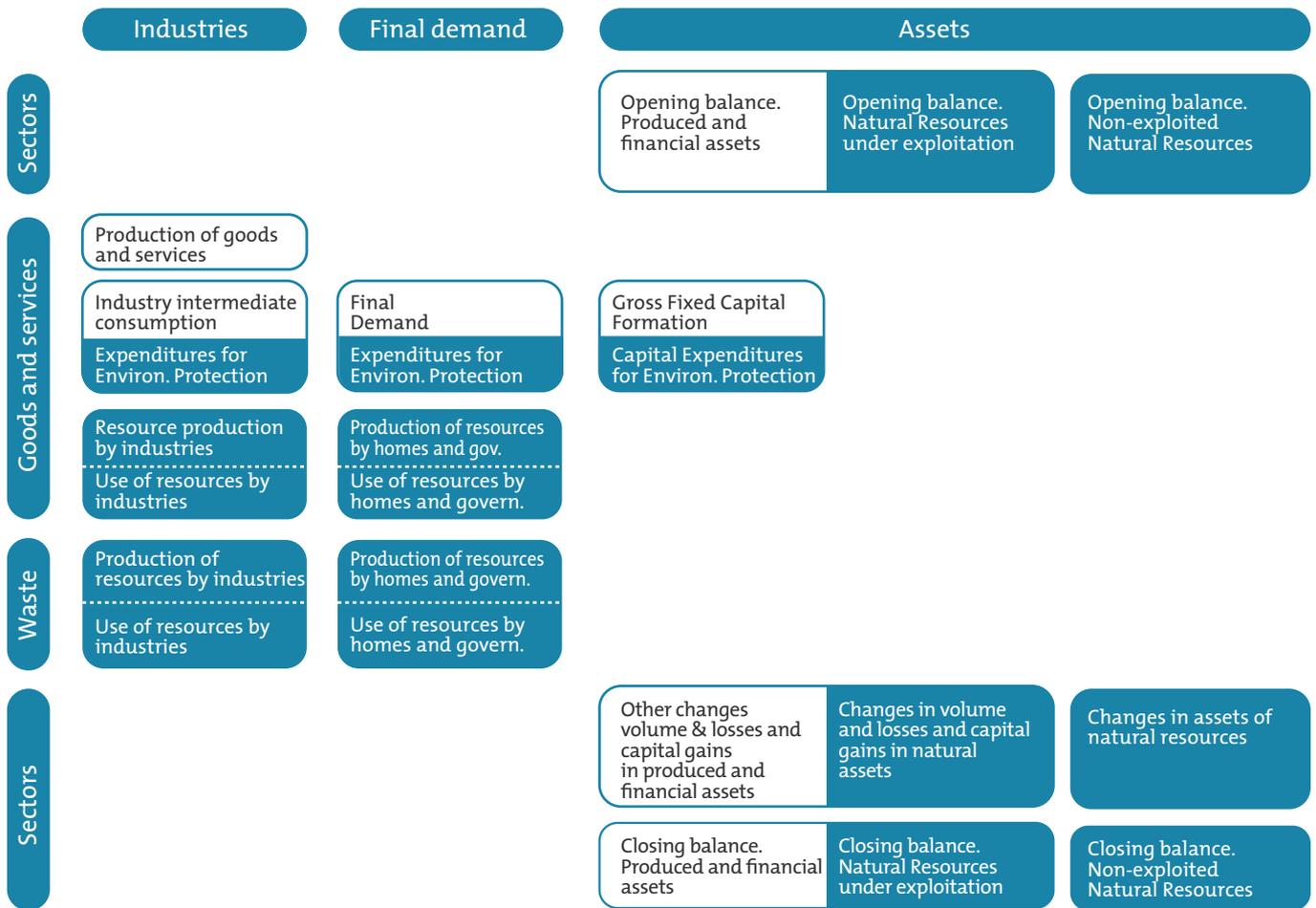


Source: UNSD

These concepts may be summarized in the accounting scheme of Figure 3.4. This shows the components of the economic accounts (white colored blocks) and those of the environmental accounts (light blue colored blocks). This helps to better understand the complementary role of environmental accounts over economic accounts of the nation.

In Figure 3.4 there are two interrelated areas. On the one hand there are the asset accounts and their variations; and on the other, the production flows and supply and demand of goods and services. The assets area defines the opening and closing balances of three large types of assets: financial assets and produced fixed assets; natural assets under exploitation (for example a non-cultivated forest under exploitation); non-exploited natural assets. The first two are valued by the market, the third does not have a market value.

Figure 3.4:
Asset and flows accounts
at the SEEA



Source: Presentation. Sokol Vako. United Nations Statistics Division. SEEA-UNSD-GIZ-ECLAC course. Santiago (July-2015)

The composition of the economic and environmental assets and its relationships can be clearly seen in Figure 3.5. The embedded relationship between economic and environmental systems and ecosystems may be observed below.

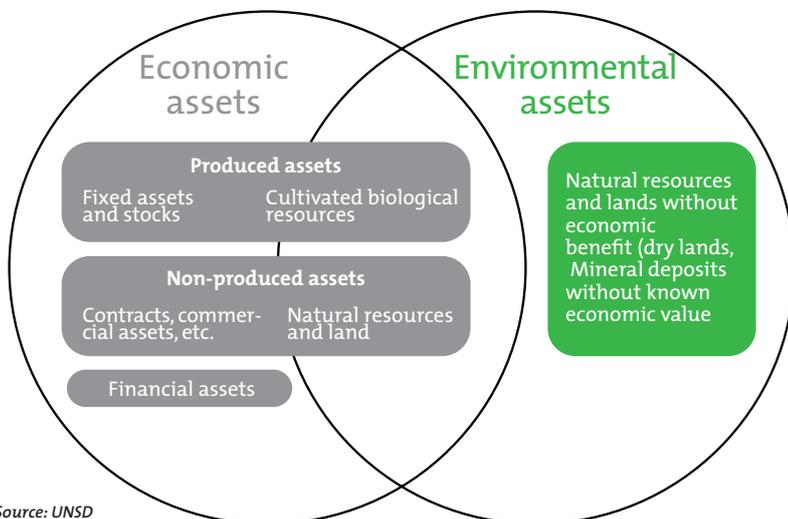


Figure 3.5:
Relationship between
environmental and
economic assets

Source: UNSD

Ecosystem accounts are an extension of environmental accounts that take a closer look at the role of the environment in society. One of the fundamental changes in this extension is the incorporation of each ecosystem as a new agent in environmental and economic accounting. Ecosystems are sums of biotic and abiotic resources that have certain characteristics that make them special. The country is made up of a group of ecosystems. These ecosystems are georeferenced and, in this respect, they are similar to the agents of regional accounting. However, the geographic units in regional accounting are regions, provinces, and municipalities that constitute administrative divisions in a country. In contrast, ecosystems are geographic areas that are defined for the variety of their environmental resources.

Despite the fact that their objectives are clear, the structure of ecosystem accounts is not yet consolidated, so they are maintained as experimental. Table 3.1 shows a list of these accounts.

The difficulties inherent in the valuation of stocks and flows of ecosystems, that is, of natural assets and services that have no market value, results in measurements that are mainly in physical units. In general, ecosystem services and their identification and valuation constitute the three most relevant conceptual problems in ecosystem accounts.

Finally, the accounts and tables proposed by the SEEA and SEEA-EEA are the most relevant sample of environmental assets and flows. In practice, the accounts may extend in many directions. For example:

- Geographically: Environmental accounts may be created by regions or ecosystems.
- By institutional sector: Following the openings of financial and non-financial companies, governments, and non-profit organizations, among others, according to the classification used in national accounts.
- By property of the institutional units: This is to separate what is private and public and all its openings. For example, in the case of environmental protection expenditures.
- By class or type of asset: In the case of water, consider superficial and underground.

Possible openings are implicit in all the classifications included in the accounts and tables of SEEA. These possible openings are clearer when examining the problem of data modelling.

Table 3.1:
SEEA-EEA accounts and tables

Acct. ID	SEEA-EEA Table	Account or table	Measure	Operation	Object	Operation
1.1.	3.3	Physical flows for ecosystem services for a UCE	UUFF	PR	Environ. services	Supply
1.2.	3.4	Generation and use of ecosystem services for a UCE	UUFF	OU	Environ. services	Supply-Use
1.3.	4.1	Physical account of land coverage	UUFF	ST	Land	Asset
1.4.	4.2	Asset account of water resources in physical units	UUFF	ST	Water	Asset and variations
1.5.	4.4	Changes in the condition of an ecosystem for a UCE	UUFF	ST	Natural assets	Asset and variations
1.6.	4.5	Flow of ecosystem services expected at the end of the accounting period	UUFF	PR	Environmental services	Supply
1.7.	4.6	Carbon balance account	UUFF	ST	Carbon	Asset and variations
1.8.	6.1	Stylized registry of ecosystem assets	UUMM	ST	Ecosystems	Asset and variations
1.9.	A6.1	Simplified sequence of accounts for ecosystems	UUMM	CI	Ecosystems	Flow (variations)
Analytical table						
2.1	4.7	Biodiversity of species account for a UCE	UUFF	ST	Biodiversidad	Asset and variations
2.2	A4.2.1	Endangered species accounts	UUFF	ST	Especies en peligro	Asset and variations

Acronyms in Spanish: UUMM: Monetary Units

UUFF: Physical units

UCE: Unit of Ecosystem Account

OU: Supply and use

PR: Production

ST: Asset (Balance)

CI: Integrated accounts

Source: Own creation

3.3 Institutional framework

The institutional framework proposed for the development of environmental accounts and indicators is coherent with the structure of the environmental institutional framework and the development of statistics in Chile (see Chapter 2). For this reason, an environmental accounts system is proposed, coordinated through an existing environmental institutional structure, subsidiary with respect to the creation of accounts. By subsidiary we mean a system that centralizes the information and systems of definitions, protocols, and classifications, but allowing the sectoral public Agencies the development of their own sectorial accounts.

The environmental problem is present in all economic activities; therefore, it affects all the entities that make up the public and private sector. However, limiting the definition of the protagonist entities of environmental accounting and statistic “data”, a group of organizations must be restricted to three hierarchical levels: first level (Council of Ministers for Sustainability); second level (Interinstitutional Committee for Information and Environmental Accounts); and third level (Environmental Accounts Unit at the MMA). The first and second level will have the institutional responsibility and the third level will have the executive responsibility (Figure 3.6).

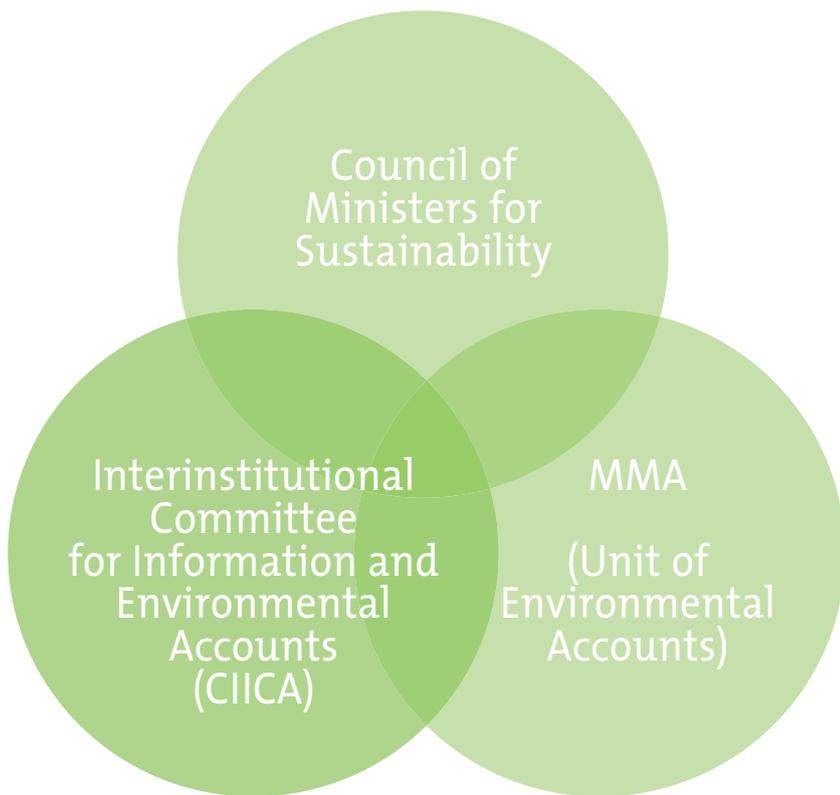


Figure 3.6:
Levels of the
institutional
framework

Source: Own creation

3.3.1 Institutional Responsibilities

3.3.1.1 Council of Ministers for Sustainability

The MMA has the legal responsibility regarding Environmental Accounts and the development of environmental indicators. However, due to the intersectorial nature of the environmental information, we propose that the Ministry of the Environment should have the global responsibility of the implementation of the System of Environmental Accounts, with the participation of the Council of Ministers for Sustainability as an information entity for its members.

3.3.1.2 Interinstitutional Committee for Information and Environmental Accounts (CIICA, for its acronym in Spanish)

A step forward in the development of the institutional framework for the SICAEE will be the creation of the Interinstitutional Committee for Information and Environmental Accounts (CIICA). The CIICA will be created by a resolution of the MMA, and it will be the interinstitutional space where all the public agencies participate with responsibilities in matters regarding the collection of environmental statistics, as well as the Central Bank and the INE. The CIICA would expand the management sphere of the current Interinstitutional Committee for Environmental Information (CIIA), adding the task of developing Accounts. Box 3.1 identifies the main responsibilities of the CIICA. The first five are inherited from the CIIA, and the last task specifies environmental accounts. The Division of Information and Environmental Economics of the MMA will remain in the CIICA as an operating entity with the responsibility of coordinating and implementing the system.

BOX 3.1: RESPONSIBILITIES OF THE CIICA

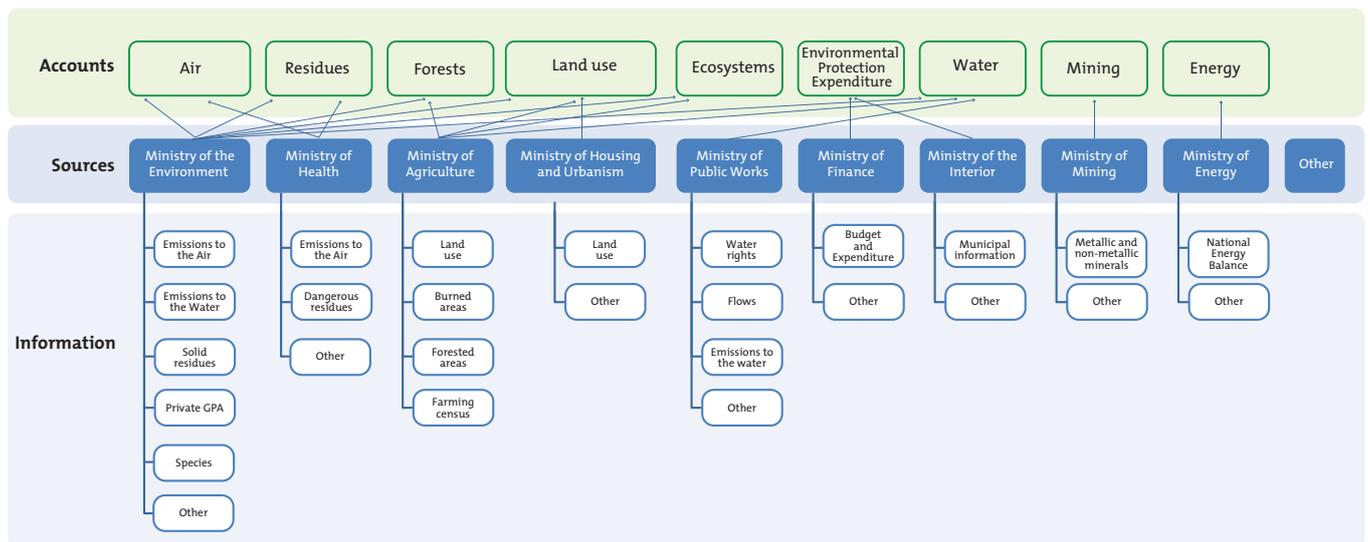
1. Provide and validate the environmental information generated from its competencies, according to the requirements and objectives defined by the Committee.
2. Review and propose policies and guidelines regarding environmental information.
3. Detect the deficiencies and gaps of the environmental information for the management and objectives of the country, and propose and implement initiatives that cover these gaps.
4. Ensure compliance with the guidelines, procedures, and mechanisms defined for environmental information.
5. Propose and approve initiatives aimed at updating and improving the quality of environmental information, its effective recovery, and adequate processing.
6. Collaborate with the Ministry of the Environment in managing and developing environmental indicators and accounts.

In the performance of its specialized functions in the flows of information regarding the environment (Figure 3.7) the CIICA will be supported by and seek synergies with the National Statistical System (SEN, for its acronym Spanish), producer networks, and statistics users coordinated by the National Institute of Statistics (INE, for its acronym in Spanish). The working relationship should respect the management spheres of each institution under the common objective of an efficient performance, with high productivity, timeliness, and transparency in the production, coordination, and dissemination of environmental accounting.

The different Ministries develop their own sectorial Satellite Accounts, according to their priorities and budgets. The Ministry of the Environment, through the Unit of Environmental Accounts (UCA, for its acronym in Spanish) will act as a technical agent, providing information and supporting the Services in their efforts.

However, the effort of each agent in the system, and the effectiveness of the institutional system for the development of long-term environmental accounts, depends on the establishment of legal mechanisms that involve decentralized work in the different public Agencies. After the experience of the first two years of operation of this institutional framework, a comprehensive proposal will be made for a legal reform to implement environmental accounts.

Figure 3.7:
Flows and sources of information for environmental accounts



3.3.2 Executive responsibility: Unit of Environmental Accounts at the MMA

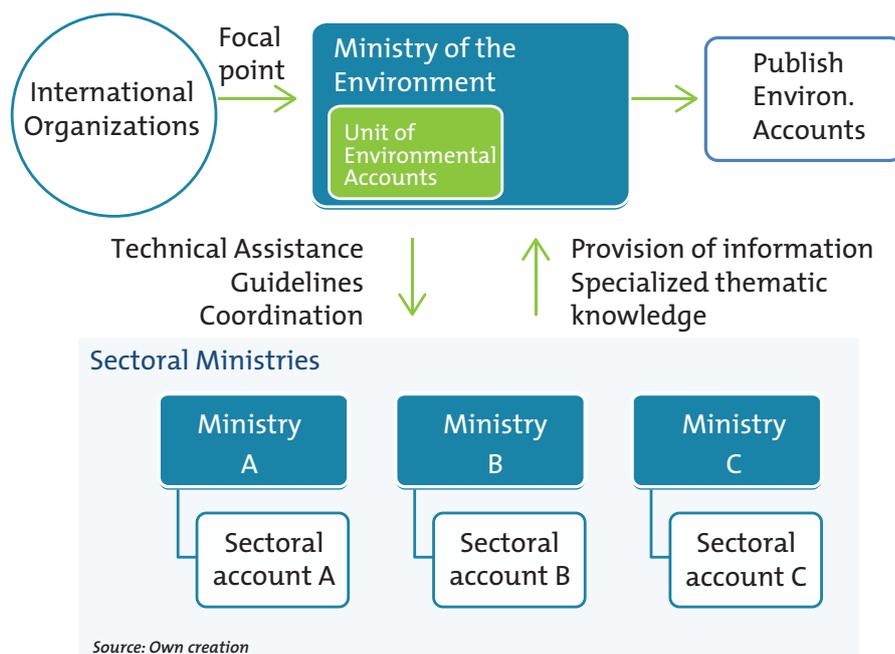
The third level will be in charge of operationalizing the environmental accounts and indicators. This will be headed by the Unit of Environmental Accounts that will be created at the MMA, as a technical unit dependent on the Division of Information and Environmental Economics. The operative work has two dimensions: the accounting dimension and the scientific or technical specialization in the sphere of a specific and economic environmental account.

With respect to the first dimension, the Unit of Environmental Accounts will act as a technical intelligence unit, providing information and technical capacities to the services, coordinating the accounts through the development of the SICAE, acting as a focal point with the International Agencies. Most importantly, the Unit of Environmental Accounts will develop a data infrastructure system that enables the delivery of information and basic statistics of public services, perfecting the current integrating system. The functioning structure is shown in Figure 3.8.

With respect to the second dimension which we will call specialized knowledge, the role that the ministerial technical units must play is essential as providers of expert knowledge regarding statistics and environmental issues, user demands, practical aspects of the capture and flow of data, institutional context, and historical experience in the area of each environmental subject.

Incidentally, these two dimensions are not mutually exclusive. In fact, the MMA, for example, has obtained the accounting and specialized knowledge in the sphere of emissions. At the same time, the Ministry of Energy joins together both dimensions of the practical work obtained in the historical development of the energy balances and the practical work as an information provider of national accounts.

Figure 3.8:
Proposal for
An Institutional Structure



BOX 3.2: FUNCTIONS OF THE ENVIRONMENTAL ACCOUNTS UNIT

1. Deliver recommendations to the Council of Ministers for Sustainability with respect to the priorities of the collection of environmental information.
2. Generate the technical capacities to create environmental accounts and support and advise other Government Agencies.
3. Advance in the global construction of an Integrated System of Ecosystem and Economic Environmental Accounts (SICAEE), gradually moving toward a system that contains all the relevant information of the country.
4. Coordinate and systematize the collection of environmental information through the Interinstitutional Committee for Information and Environmental Accounts.
5. Develop and construct the base of the data infrastructure for the creation of environmental accounts and indicators.
6. Develop prioritized pilot environmental accounts.
7. Analyze, validate, and evaluate the sectorial environmental accounts that will be in charge of other State agencies.

In this third level of the institutional framework, the participating units of the operative work will organize in terms of an input-output information scheme. Most of the interinstitutional units fulfill the role of producing inputs for environmental accounts and indicators. A minority will be in charge of creating environmental accounts, tables, and indicators. The roles of input producer and producer of environmental accounts, tables, and indicators are not mutually exclusive.

At the same time, the development of specific environmental accounts and indicators are not part of an indivisible whole in charge of one single entity. Eventually there might be the option of dividing the management of one account in more than one entity of the organizations that make up the CIICA. This flexibility will be possible as a result of the active coordinating role of the Unit of Environmental Accounts of the MMA (Figure 3.8).

The INE must play an essential role as an official producer of statistics in the country. Although until now it has not fully integrated to the organizational work of the environmental accounts due to its agenda and available resources, in the future it must become a strategic partner in the institutional development of the SICAAE.

A key technical support for the Unit of Environmental Accounts will be that offered by the Central Bank of Chile, given its ample knowledge and experience in charge of the national accounts as well as in the process of relating the environment and the economy through this type of work.

Table 3.2 shows the institutional network that will be functioning in the management of environmental accounts and indicators. The rows enumerate a subset of the institutions that, given the current institutional framework, generate data that are inputs. The columns enumerate a subset of the institutions that could be producers of environmental accounts and indicators. Noteworthy example is that of the Ministry of Agriculture, which groups institutions such as ODEPA, SAG, CIREN, CONAF, INFOR, INDAP, INIA, CNR, which generate relevant information for future accounts regarding land use, timber resources, water, energy, and ecosystems. This Ministry has communicated the availability of the mentioned services, in order to participate in the implementation of the National Plan of Environmental Accounts.

The case of the Ministry of Agriculture shows the need to address the subject of implementation from a panoramic perspective, and it directly involves decision makers who are the main users of the indicators that emerge from this process. In practice, Table 3.2 is an input-output matrix of environmental information that allows to configure this wide panorama, and becomes a working tool to structure the institutional network that participates and will participate in the development of environmental accounts and indicators.

As can be seen, the work in its strictly accounting aspects and specialized knowledge of the specific environmental account requires the strengthening of the technical teams in the organizations involved in each case. At the very least, a specialist in environmental accounting is required in the organizations that will participate more closely in the development of an account. This specialist may be externally hired or trained in the pertinent offices of each organization.

Table 3.2:
Matrix of Environmental
Information-Product.
Participating institutions

Institutions that produce information inputs	Acronyms	Institutions that produce accounts and indicators									
		MMA-UCA	SERNAPESCA	DGA	SISS	CONAF	CIREN	COCHILCO	SERNAGEOMIN	CNE	
Office of National Emergency	ONEMI										
Undersecretary of Regional Development	SUBDERE										
Undersecretary of Fishing and Aquaculture	SUBPESCA										
National Fisheries and Aquaculture Service	SERNAPESCA										
National Statistics Institute	INE										
Fisheries Development Institute	IFOP										
Internal Tax Service	SII										
General Directorate of the Maritime Territory and Merchant Marine	DIRECTEMAR										
Directorate-General for Public Works	DGOP										
General Water Directorate	DGA										
Superintendency of Sanitation Services	SISS										
Agricultural Research and Policies Office	ODEPA										
Institute of Agricultural Development	INDAP										
Agriculture and Livestock Service	SAG										
National Forestry Corporation	CONAF										
National Irrigation Commission	CNR										
Forest Institute	INFOR										
Natural Resource Information Center	CIREN										
National Agricultural Research Institute	INIA										
National Land Information Coordination System	SNIT										
Chilean Copper Commission	COCHILCO										
National Geology and Mining Service	SERNAGEOMIN										
Executive Secretariat of Transport	SECTRA										
National Energy Commission	CNE										
Chilean Nuclear Energy Commission	CCHEN										
Superintendency of Electricity and Fuels	SEC										
Chilean Agency for Energy Efficiency	ACHEE										
Central Bank of Chile	BCCH										
MMA. Unit of Environmental Accounts	MMA-UCA										

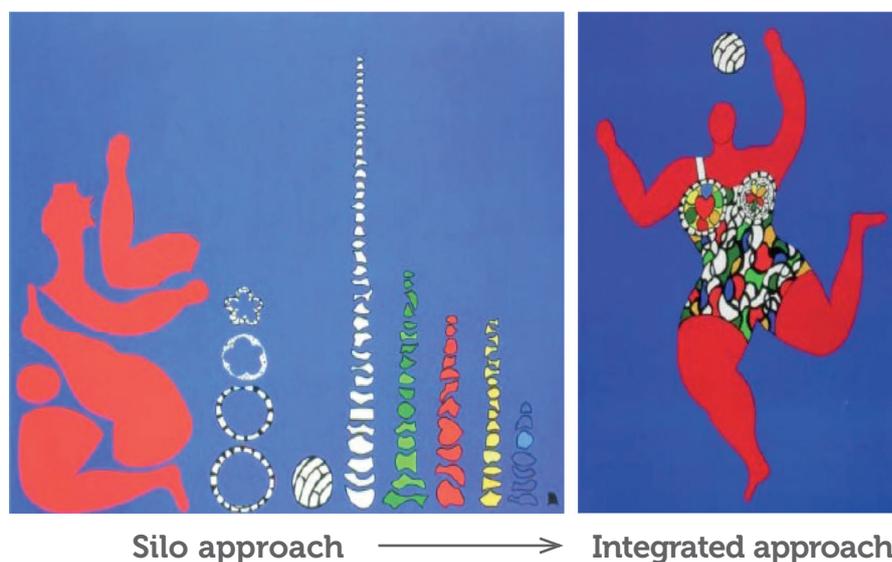
Source: Own creation

3.4 Data model

In general, there are many negative experiences in the design of accounting systems. One of the main problems is the silo or disintegrated approach, which has disjointed dimensions, classifications and data bases in contrast to a systemic or integrated approach, whose parts are organized in a harmonic, compact, and dynamic manner.

When the approach is disjointed, there are many functioning and performance problems in the information systems. Integration is essential because an economic-environmental system must support the analysis and policy decisions in a context where there are multiple interrelated relevant aspects and institutions for sustainable development (Figure 3.9).

Figure 3.9:
Data architecture
approaches



Source: UNSD

BOX 3.3: PROBLEMS IN THE FUNCTIONING OF ISOLATED STATISTICAL SYSTEMS

- Problems in data collection.
- Duplication of data.
- Aggregation and summary problems.
- Mix of data and processes.
- Flexible consultation difficulties for users different from producers.
- Problems to create historical information (time series).
- Difficulties to review methodologies and data update.
- Poor use of resources.
- Approach focused on data and not on analysis.
- Lack of standard processes.
- Cannot be socialized.
- Data traceability cannot be reconstructed.
- Lack of standardization or normalization of data.

A proper design of data bases must explore and seek elements that are present in all the parts of the system to differentiate them from those that are typical of specific aspects.

The design of data bases based on environmental accounts is more complex than that of a traditional accounting system, as each of the environmental assets and their flows bring about specific problems of a different nature. The concurrence of different classification systems and physical and monetary measurements, among other difficulties, increases the normalization problems of the data, which is the fundamental task in a comprehensive approach. The intuitive response is an analytical approach that conceives each account (emissions, water, energy, forests, minerals, etc.) as different but within coordinated systems.

Following is an implementation approach for data bases partially used in the compilation of the Chilean national accounts. For an integrated perspective of the data modelling with an economic base, it is necessary to distinguish two dimensions in the modelling or architecture of data:

- Structural architecture
- Analytical or functional architecture

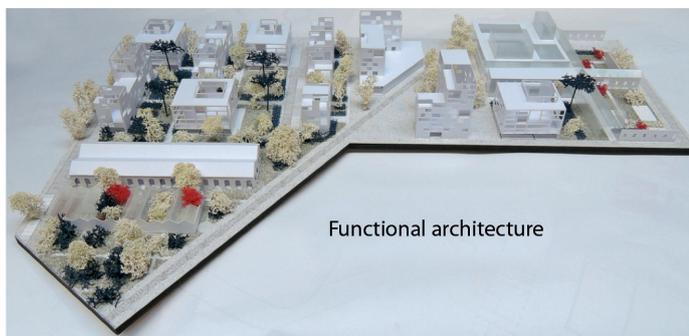
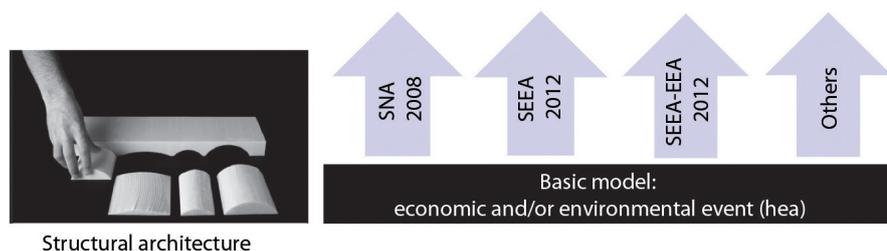


Figure 3.10:
The double structural and functional perspective in accounting



Source: Own creation

Structural architecture refers to the organization of data that are common in all the possible data bases of an economic or environmental origin. Every element that constitutes the foundation of specific systems is a part of structural architecture. For example, the classification of institutional sectors and the boards of agents are structural because they will be common to any economic and environmental information system. There will always be an agent involved in an economic or environmental event. Those agents must be classified as companies, governments, and homes (institutional sectors), according to the classifications established in the SICAAE.

Analytical or functional architecture is defined according to the fields of application. Every field of application generates accounts, tables, and indicators that have an analytical purpose. For example, the classification of environmental producers, used in Tables, 3.2, 3.4, 3.5, 3.6 of the SEEA, is analytical or functional. The separation between specialized, non-specialized, and independent producers has to do with a utilitarian approach which is typical of the environmental subject. The classification of producers crosscuts the structural classification of institutional sectors, because an environmental producer may be a company, a government entity, or a home.

Accounting, in general, turns functional architecture into accounts, tables, and analytical indicator plans, both at the company level as well as in the economy. From this perspective, the SCN, the Central Framework of the SEEA, the SEEA-EEA, or all the specific environmental accounts manuals (water, energy, and others) constitute analytical or functional “account plans”.

Data bases with a comprehensive approach must not be designed under an analytical or functional perspective. The accounts plans and their analytical concepts are queries to a data base that must be organized under a structural architectural approach. This postulate becomes imperative within a system such as the SICAAE, where diverse “accounts plans” coexist.

The structural data model extracts and normalizes the essential elements of all information systems and, from the most abstract level of definition, it defines models that are implemented in relational data base softwares.

The most abstract model of economic data starts from the basic definition of the registry of an economic and/or environmental event (hea), where:

$$\text{hea} = f(x, i, j, t, e, c, f, i, b, m, v, j)$$

The economic and environmental events assume (implicitly) a double entry account in most of the operations. In addition, two large categories of attributes or adjectives may be established: those that refer to the context of the transaction, and those that refer to the quantification of the object. The context attributes refer to the time and space determined by the three basic elements: agent (j), operation (x), and object (i). The quantification attributes identify the position or topology of the object, considering its location in the agents ‘capital, and if it deals with assets, liabilities, or capital. At the same time, they refer to the diverse forms of measurement of the object, where the measurement or quantification components are distinguished. The basic elements of the quantification attributes are quantity, price, and traded value. These attributes are: measurement (m) in

currency of quantity; valuation (v) in monetary terms; position (b) or location of the object in the agents' capital; registry (r) that identifies the component and format of the data.

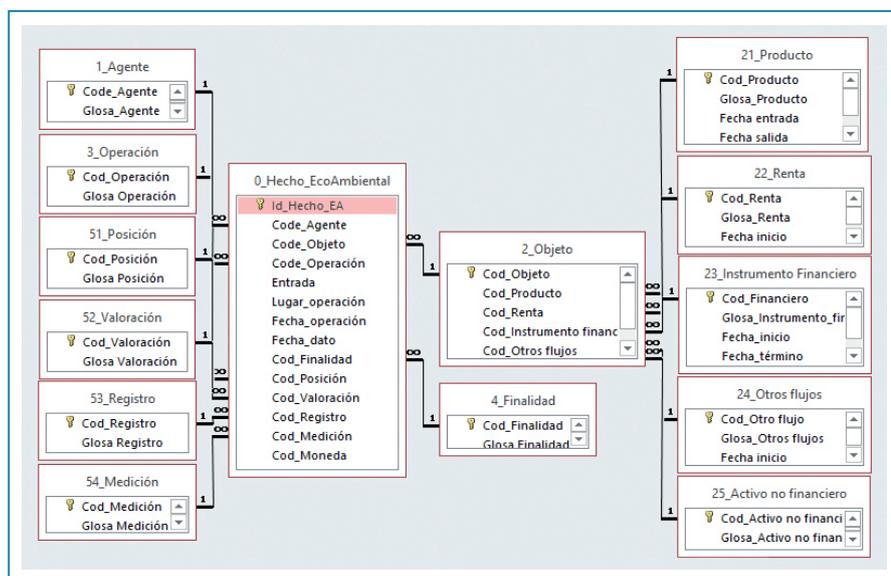
The data may be organized in a hypercube that contains the dimensions shown in Table 3.3. Each attribute originates a table in the relational data base. Considering the dimensions thus defined, the model, with a greater level of data specificity would be as presented in Figure 3.11.

		Agent (j)	Object (i)	Operation (x)
Time	(t)	jt	T	xt
Space	(e)	je	e	xe
Entry	(c)			xc
Position	(b)		bi	
Measurement (m)			mi	
Valuation	(v)		vi	
Registry	(r)		ri	

Table 3.3:
Dimensions of the
“hypercube” of a
multidimensional
accounting base

Source: Own creation

Figure 3.11:
Data model of a
multidimensional
accounting system



Source: Own creation

The multidimensional model described here, corresponds to the definition of “pure” entities. With this structural design it would be possible to integrate the national accounts that constitute inputs for the SEEA in one data base. All the information variables that exist in the SNA and the SEEA constitute different queries to the information system thus described.

The proposed data model constitutes a normalized approach in order to respect the diversity of classifications and data bases that historically have existed in the organizations, allowing multiple information bases to relate with one another.

The normalization principle requires that the common elements in the model tend to standardize. With respect to this, the most significant case is the model of an agent with a company board that should be common to all the organizations participating in the accounts. In other cases, as for example in the table of activities, which also differ between organizations, standardization may be avoided. However, it is essential to establish the relationships between the tables of activities when said organizations participate in the processing of interrelated data.

The elements put forth regarding the modelling of interinstitutional data are valid for any organization that participates in the development of environmental accounts as supplier and/or final developer of the account, and it is one of the main functions of the CIICA, executed by the Unit of Environmental Accounts.

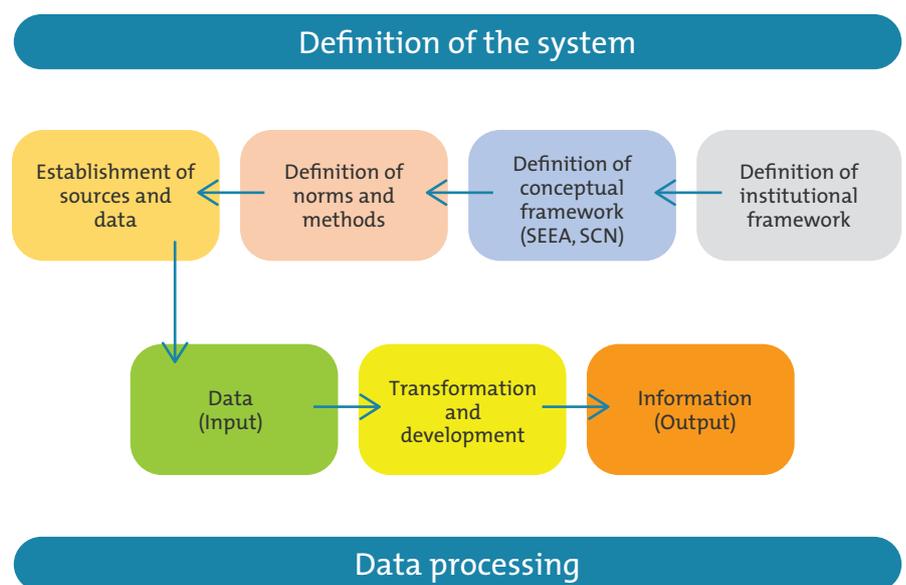
3.5 Process model

The process model must analyze and document all the flows that go from the information inputs to the outputs. The objective is to develop the work at the lowest possible cost, with productive efficiency in a timely manner.

This model corresponds to the production phase of information which, as in any other manufacturing activity, develops in stages and according to an industrial design of the process and the producing establishment.²¹ In data processing, data (raw materials) are entered as inputs, and transformed through successive processes (products in process) to finally obtain information (finished products) that constitute outputs. The complete cycle of the engineering or design processes and of the data processing are shown in Figure 3.12.

Each of the large phases of the process is made up of many sub-processes that must be explicit in the implementation of environmental accounts. Each phase in Figure 3.12 implies at least one product that may be a document or a manual, files, questionnaires, dictionaries, or others in the definition of the system. The products in the data processing phases are: data bases, records, tables, boxes, accounts, and indicators that incorporate aggregate value increasingly and gradually to the basic data registries.

Figure 3.12:
Process Model. Design and processing



²¹ The proposed process model does not have direct references. However, there are two indirect references that have great value. On the one hand, the building blocks model of the guidelines regarding comprehensive economic statistics (United Nations 2013); on the other hand, the model that is used in the national accounts of Chile. The bases of that model have not yet been formalized as an official publication of the Central Bank of Chile.

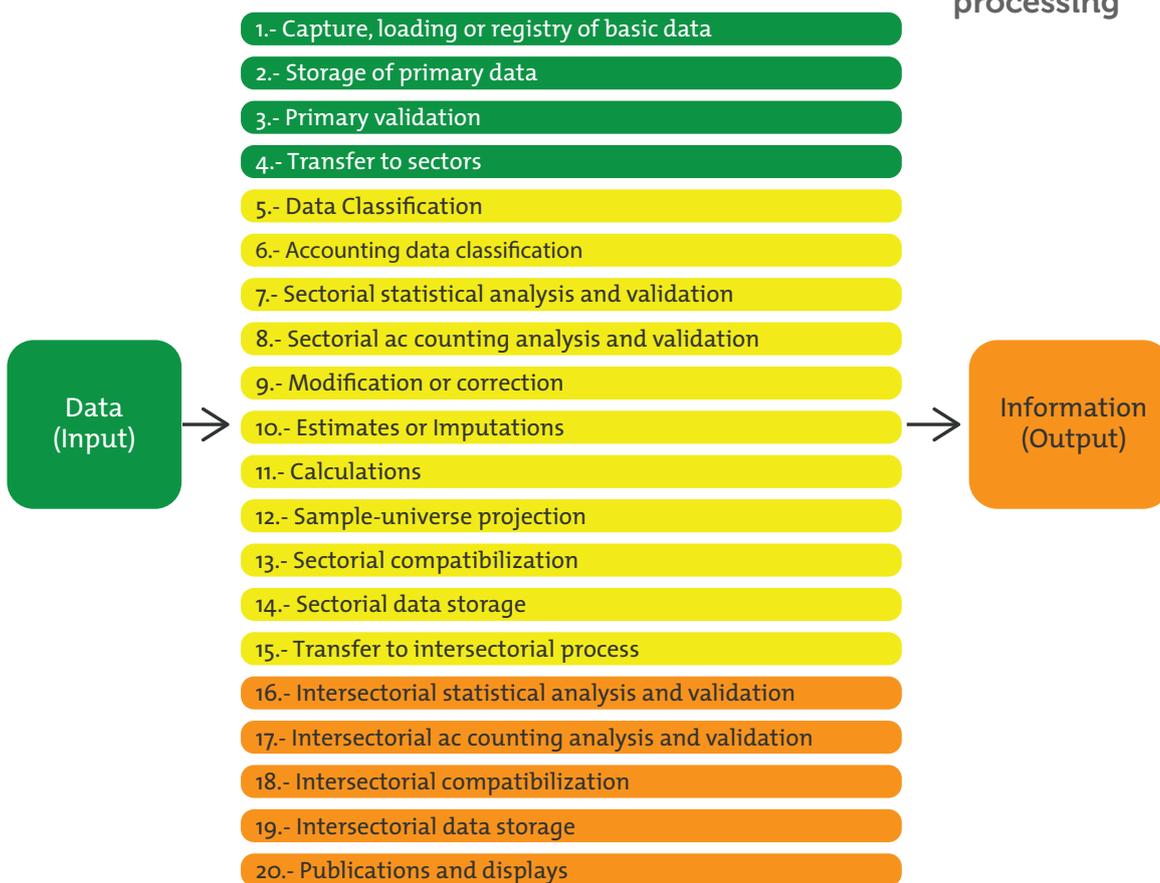
Source: Own creation

Following is an analysis of the activities of data processing, based on the work used in national accounts. It should be noted that the application of the model in national accounts involves many professional resources and takes a considerable amount of time. For this reason, the publication of the national accounts in their revised or final version has a three year lag.

Part of this period may be explained by the delivery of the final data from the primary data sources, but another no less significant part is the time dedicated to data analysis, validation, and compatibilization. The working experience of the national accounts will be very useful for the implementation of environmental accounts. The Central Bank has committed to collaborate providing technical assistance and information to the MMA and the organizations that make up the institutional framework of the environmental accounts.

A possible detail of the processing is shown in Figure 3.13. It is made up of twenty phases or steps that go from the capture of basic data to the publication of a final product (account or indicator).

Figure 3.13:
Data processing



Source: Own creation

3.6 Data infrastructure

The processes described in the previous section are closely related to information and communication technologies (ICT). The ICTs are instruments that enable the functioning of the processes. However, technologies alone do not ensure that these processes are carried out in the most efficient and effective manner. It is therefore essential to have a systems design that contributes to the optimal functioning of the processes.

Currently, the Integrated Environmental Information System (SIIA) and the Environmental Data Infrastructure (IDE), are found in independent data bases. The objective is to advance toward the integration of these into one large geographic and alphanumeric data base, facilitating the loading, updating, and consumption of information for environmental accounts and indicators.

The integration of systems demands a significant investment in resources. As a first step, during 2015 there was a migration of the data base drivers and all the functioning of the SIIA and IDE from the current commercial software (Microsoft SQL Server) to a free database driver (PostgreSQL), to guarantee uninterrupted functioning without financial restrictions. The challenge of the complete integration of both systems is planned for 2016.

The SIIA and IDE systems thus conceived would constitute the SICAAE's Data Infrastructure and would place diverse functions at the disposal of users.

BOX 3.4: USES OF THE SICAAE'S DATA INFRASTRUCTURE

1. Automatic data capturing (by web service) from systems or databases, or manually through the upload of Excel files;
2. Generation of a data warehouse with the captured information to develop cubes resulting from the online analytical processing.
3. Development and publication of environmental indicators and accounts in a dynamic, automatic, and regular basis.
4. Access to the mentioned functions by specifically registered users.
5. Availability of environmental indicators and accounts that are meant to be disseminated for the public in general through the SINIA webpage, in its environmental statistics and indicators section, from where tables, graphs, and meta data may be seen and downloaded.

In this context, environmental accounts must be integrated to that system. In a first stage (phase 1 and 2 in the implementation projects), the development of the accounts will be carried out through Microsoft Access and Excel as enabling tools. Thus, non-professional information developers will be able to implement and apply, with flexibility and ease, the aspects of the data model and processes addressed in the previous sections. Later, in the final implementation phase of the

accounts and indicators, the data models and the flow charts of the processes will be incorporated to the data infrastructure to be developed.

Figure 3.14 makes a general approximation to the relationship between the operational processes model and the data infrastructure.

The data infrastructure is the platform that enables the development of data processing. The available functions enable the automatic capture of data through the web, as well as other types of entries which include manual registries. The data is entered to the data warehouse, which allows to back up the primary information, both being processed and completed. The analytical phases of the data process (validations, attributions, harmonization, and projections) are supported by the analytical processing tools (cubes). Finally, through programs or specialized software, it is possible to address the outputs of the system, that is: publications, displays of all types, including the IDE's own.

It is important to highlight that one of the objectives of the integrated system is to open the queries toward all the entities of the data model, understanding the level of the micro, meso, and macro-data, only conditioned by the information that does not transgress the limits of statistical confidentiality.

The nature of environmental information demands the development of statistical and spatial information technology. A vision of the future must consider that the publication of environmental accounts and indicators, predominantly digital, must be produced jointly. For example, the accounts of environmental assets (water, energy resources, mineral deposits, forests, fishing resources), should be published jointly in terms of statistical tables in physical and monetary units (when applicable) and as location maps, with different levels of display.

The emissions accounts also require the mapping of the sources of all kinds of emissions. It is a challenge for the future to incorporate georeferencing to manufacturing, construction of infrastructure works, and transportation statistics, among others.

Finally, ecosystem accounts are mainly georeferenced accounts. The main observation units are ecosystem territorial units. Within these units, the use of the land, deposits, and industrial establishments will be defined. These must also be georeferenced.

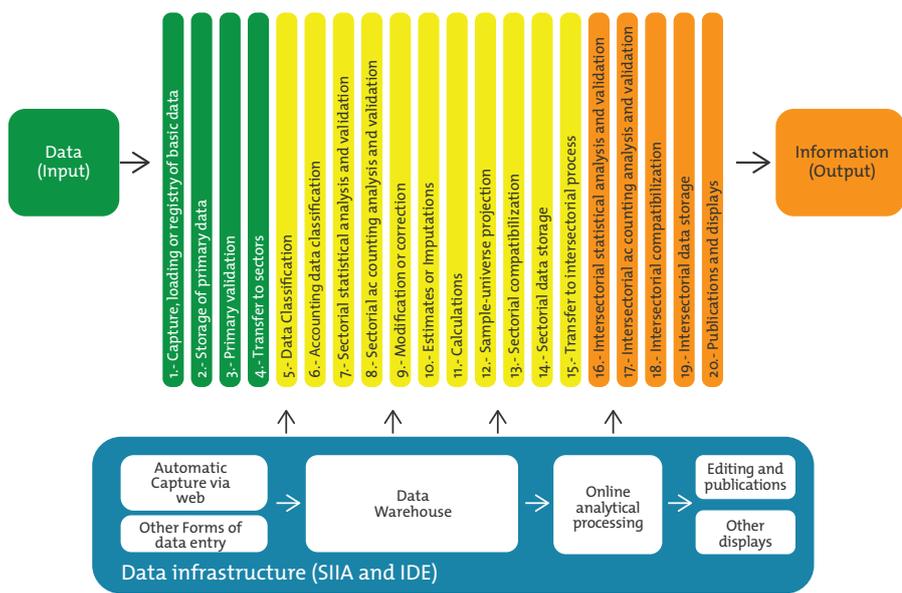


Figure 3.14:
The relationship between the processes model and data infrastructure

Source: Own creation

4. THREE YEAR WORK PLAN

Installing an accounting system as broad as the SICAEE is extremely complex, as it involves multiples actors and significant resources. Consequently, there is no doubt that its implementation will be a task beyond the management of one government. For this reason, this first National Plan not only presents a strategic vision of the system, but also proposes a working plan for the next three years.

The following proposal, in the context of SICAEE's strategic vision previously presented, is consistent with the recommendations of the United Nations Division of Statistics, with our environmental institutional structure and the production of basic statistics. The proposal indicates the future development since, beyond the specific results; it establishes the institutional framework, a working methodology, and a technological platform. In addition, it proposes the implementation of a first set of accounts, analytical tables, and indicators. More specifically, the following objectives and goals are proposed for the next three years.

4.1 Objectives

The objectives of the Work Plan are:

1. To implement a governance model for the construction of the System of Environmental Accounts, where the Ministry of the Environment acts as a focal point.
2. To develop the conceptual framework of the integrated system of environmental accounts.
3. To create an information technology system to integrate the environmental information.
4. To develop technical capacities within the Ministry of the Environment and in the relevant Public Services.
5. To create and promote the development of pilot environmental accounts.
6. To carry out an effective public communication of the objectives and results of the project so as to commit the Public Services and citizens in the development of satellite Environmental Accounts.

4.2 Goals

To fulfill these objectives the following goals are proposed for December 2018.

1. Validate the institutional framework proposed through the Council of Ministers for Sustainability, creating the Interinstitutional Committee for Information and Environmental Accounts and making it operational, as well as the Unit of Environmental Accounts in the Ministry of the Environment.
2. Propose and reach an agreement regarding an accounting framework that integrates the National Account Subsystems (SNA), Environmental Accounts (SEEA) and Ecosystem Accounts (EEA) applied to Chile.

3. Develop and implement a computer information system that integrates environmental information.
4. Generate internal capacities through national and international workshops regarding the environmental accounting system.
5. Create and publish pilot satellite accounts in the areas of emissions to the air, forestry, land ecosystems (whose development depends on a GEF Project), and environmental protection expenditure.
6. Ensure that the Environmental Accounts initiative is known by the Public Services which recognize the Ministry of the Environment as the focal point.

4.3 Activities

To comply with these objectives and goals, a series of activities are proposed with their associated products. These are detailed in Table 4.1. The activities are grouped in the six categories related with the objectives detailed above: institutional framework; conceptualization and integration of the system; data infrastructure; technical training; development of pilot accounts; and public communication.

**Table 4.1:
SICAEE Activity
Programming**

Activities	Yr. 1	Yr. 2	Yr. 3	Products
Institutional Framework				
Create the Interinstitutional Committee for Information and Environ. Accounts	●			Resolution of the MMA creating the CIICA
Create the Unit of Environmental Accounts of the MMA	●	●		Creation of UCA at MMA
Establish internal coordination's	●	●	●	Working meetings CIICA
Information and Dialogue with Relevant Actors	●		●	Working meetings CIICA
Training and coordination to the Public Sector	●	●	●	Training at CIICA
Establishment of Priority Accounts and Indicators	●			Work Document
Conceptualization and Integration of the System				
Conceptualization of the System	●			Work Document
Development of the SICAEE	●			Information System
Data Infrastructure				
Improvement and development of the SIIA and IDE		●	●	Computer Information System
Development of an Integrated Environmental Information System		●	●	Comprehensive Computer Information System
Train services			●	Work Meetings
Development and proposal of legal or binding instruments			●	Work Document
Technical Training				
Strengthening of Skills	●	●	●	Training
Development of Pilot Accounts				
Development of definitions and concepts	●			Work Document
Collection of Information	●			Work Document
Development of the Account of Air Emission		●		Account
Development of Forestry Accounts		●		Account
Development of Land Ecosystem Account MR			●	Account
Environmental Protection Expenditures			●	Account
Other Accounts proposed by Public Services		●	●	Account
Public Communication				
Work Document	●	●	●	Dissemination of document
SICAEE			●	Dissemination of document
Sectorial Satellite Accounts			●	Dissemination of document

Source: Own creation

4.4 Institutional arrangements for the implementation of the plan

With respect to institutional structure, it is expected that the Interinstitutional Committee for Information and Environmental Accounts (CIICA) will ensure coordination between the entities that generate information, minimizing the requirements to informants and the duplicity of tasks.

The Ministry of the Environment (MMA) will assume the role of coordinator of the specific work of the ministries and specialized organizations. The base tool for the rationalization and integration of the institutional arrangements must be provided by the SICAAE.

As part of the institutional strengthening, the creation of the CIICA and the Unit of Environmental Accounts are expected for this year.

4.5 Conceptualization of the System

As mentioned above, one of the challenges of the development of a System of Accounts is that the conceptual framework of a system of integrated environmental accounts has not matured yet. Consequently, any development effort for applications in Chile implies the development of a conceptual framework adapted to our reality. In this context, within the first activities of the plan is the development of a conceptual framework that integrates the subsystems of the SNA, SEEA and SEEA-EEA in a consistent and coherent manner for the Chilean reality.

4.6 Data Infrastructure

These activities include an evaluation of the internal capacities and a proposal and development of a system of integrated data. In this context, the most relevant is that the MMA will design an integrated global proposal, readjusting the current computer information systems, that is, the RETC, the SIIA, and IDE.

4.7 Technical Training

Technical skills are a central element of the proposed project and of this plan. Currently, Chile does not have experts in matters of environmental accounting. The Ministries and Public Services are also lacking the skills needed for the development or use of satellite account systems. Consequently, one of the central activities of the Ministry of the Environment will be to develop training programs throughout the three years of the development of the project, which include the training required by their own professionals to be able to carry out the plan, while at the same time providing the training that the MMA must facilitate to the organizations that integrate the technical committees during the development of the different accounts.

It is proposed that the Division of Information and Environmental Economics, through the Units of Environmental Accounts, act as a focal point for the generation of the capacities within the State, accessing the different courses and specialized international seminars. Beyond the direct training that specific professionals may obtain from external institutions, it is essential to constitute a network that enables the transfer of knowledge to the other professionals that will be involved with environmental accounts.

4.8 Development of Pilot Accounts

In the medium term, the environmental accounts project will build an institutional structure that includes a coordination unit through the Unit of Environmental Accounts as a data infrastructure, as well as develop four pilot accounts. In addition, it is expected that the Governmental Agencies develop their own pilot account projects in coordination with the MMA.

Table 4.2 shows the priority accounts for the 2016-2018 period, based on the information and priorities of the environmental agenda.

The development of pilot accounts is a key element within the activities, since although we expect progress in these first three years in the structural elements of the SICAE (institution framework, data infrastructure, etc.), the pilot accounts help visualize the objectives and products related with the system's implementation. However, the institutional and statistical reality of the country will condition the development of capacities and compliance with the goals prior to the implementation of pilot accounts. In this regard, a progressive strategy has been conceived considering:

- **Phase 1.** Development of databases and methodological background prior to the development of environmental accounts.
- **Phase 2.** Development of pilot accounts (draft) with the existing information, while at the same time identifying the existing information gaps.
- **Phase 3.** Development of the complete account considering the development of the missing data sources in phase 2.

Phase 1 was developed during 2015 with respect to two pilot accounts created by the MMA (forests and emissions). The development of phase 2 is expected for 2016. Eventually phases 2 and 3 will be completed in one project for some accounts.

A second factor which is difficult to predict is made up of the initiatives originating in the ministries and their specialized organizations regarding environmental areas (mining, energy, and public works, among others). The institutional proposal assigns the development of specific sectorial accounts to the public services supported by the MMA. Consequently, a more defined program of pilot accounts to be developed will depend on the commitment and interest of the pertinent specialized Agency, and must be addressed case by case. This will depend, among other aspects, on the availability of basic information, the prior advances made, and the budgetary program of the involved ministries. If these entities react in a timely committed manner to the development requirements of the SICAE, new activities should be incorporated to the program in Table 4.1.

Table 4.2:
Pilot Environmental Accounts

Type of account	Public Policy	Background information	Agencies or Main Divisions
Forestry Accounts, Use of Land and Protected Areas	Biodiversity Strategy	<p>Production of Accounts of land assets (land coverage), emphasizing forests and other forest lands and forestry resources (timber), according to the methodology of the SEEA 2012 Central Framework, forestry environmental accounts.</p> <p>During 2015, the MMA carried out a consultancy to identify and systematize the necessary and available information in data bases to facilitate the development of these accounts.</p>	Ministry of Agriculture, Ministry of the Environment, Central Bank, National Institute of Statistics.
Accounts of Emissions to the Air	Decontamination Plans; Taxes on Emissions to the Air; Climate Change Strategy	<p>Physical environmental accounts of emissions to the air, will be produced according to the methodology of the SEEA 2012 Central Framework, considering emissions of local contaminants and greenhouse gases according to economic activity (CIU).</p> <p>During 2015 and 2016, the MMA carried out a consultancy to identify and systematize the necessary and available statistical information databases to facilitate the development of these accounts.</p>	Ministry of Health, Ministry of the Environment, Regional Governments, Central Bank, National Institute of Statistics
Pilot Account in MR Ecosystems, includes water, CO2 capture and Particulate Matter	Biodiversity Strategy Climate Change Strategy	Following the methodology of the EEA, and working with the GEF MR team of the Ministry of the Environment, an environmental account will be developed for the Metropolitan Region.	Government of the Metropolitan Region, Ministry of Health, Ministry of the Environment, Central Bank, National Institute of Statistics
Environmental Protection Expenditures	Environmental Policy, Green Growth Strategy	<p>Following the methodology of the 2012 SEEA, which is coherent with the classification of environmental protection activities (CAPA, for its acronym in Spanish), the plan proposes to obtain the accounts for different sectors: public (starting with the Central Government supported by the DIPRES, and municipal, with the support of the SUBDERE) and private. The latter includes companies (starting with those that file in the RETC) and homes (development pending for the future).</p> <p>A first attempt to estimate the expenditure in environmental protection by the central government for 2012 was already carried out jointly by the MMA and ECLAC. This methodology will be applied to update coming years.</p>	Ministry of the Environment, Ministry of Finance, Ministry of the Interior and Public Security, Central Bank, National Institute of Statistics

Source: Own creation

4.9 The communications process of the plan's commitments

In Chile, communications and the commitment of governmental institutions with the objectives of environmental accounting occurs in an institutional framework which is fully functioning. In the context of the plan, a series of documents will be developed regarding public communications to inform about the activities of the Government and also to allow for the active use of the Accounts, statistics, and indicators that have been developed.

4.10 Budget

With respect to budgetary resources for the development of environmental accounts, they will not be concentrated or attached to the MMA. The proposal states that there will not be specific additional resources for environmental accounts, but rather proposes that the Agencies interested in developing accounts must manage the resources, as has been the case in the Ministry of Health and Undersecretary of Tourism.

In the case of the pilot accounts proposed by the MMA, the implementation of the priority accounts does not require information inputs from other services that demand development costs or additional resources, as they are already included in the current budget. With respect to the other accounts, the interested organizations must manage those resources, and the MMA will collaborate in the formulation of budgetary resources.

For this decentralized approach to the implementation of accounts, the political will of the organizations involved in the accounting of environmental resources is decisive. The MMA may not impose a schedule or dispose of the resources that the organizations themselves must manage. Once the decision has been made, the MMA will support the management with a strong commitment regarding interinstitutional coordination at a national and international level, and provide methodological support in all the dimensions of the SICAE.

4.11 Impacts and Final Results

Table 4.3 shows a summary of the impacts and final results expected toward the end of 2018.

Table 4.3:
Summary of impacts and final results

Activities	Impacts
<p>Construction of priority ac counts based on policy needs</p>	<p>Provide empirical evidence regarding the changes generated by sustainable development policies to the Ministries and their agencies.</p> <p>Improve knowledge regarding ecosystems and wellbeing.</p> <p>Improve policies and decisions regarding trade between development and conservation.</p> <p>Provide the bases to build integrated indicators for sustainable development.</p>
<p>Development of skills</p> <p>Human Resources</p> <p>Infrastructure</p>	<p>Current capacity to integrate economic environmental information to governmental decision-making</p> <p>Training for agencies and academic teams to support the current implementation of the environmental and economic ac counting system</p> <p>Public administration and civil society informed about the environment and development</p> <p>Provide empirical evidence to the ministries and their agencies relating public policies and the objectives of sustainable development</p> <p>Cost-effective construction of environmental and economic ac counts that satisfy the policy needs in a timely manner</p> <p>Improve collaboration between sectors and agencies regarding environmental and economic statistics</p>

Source: Own creation

5. CONCLUSIONS AND FUTURE STEPS

One of the consequences of the enormous economic growth of Chile in past years has been the environmental impact. The efforts to reconcile economic growth with environmental sustainability have motivated important reforms to the environmental institutional framework. However, advancing toward sustainable development requires economic-environmental information that allows not only to follow up on the status and use of the environment and natural resources, but also to evaluate its relationship and impact on the economic system.

The system of environmental accounts is an economic-environmental system that enables the generation of systematic and coherent indicators to monitor economic development and its relationship with the environmental system. Without reliable economic-environmental information it is not possible to determine the impact of economic activity and the success of environmental policies

The development of an environmental accounting system implies important challenges to the current environmental institutional framework and the production of statistics. This document presented a first global and institutional effort for the development and implementation of an integrated system of environmental accounts, which we have called Integrated System of Environmental, Ecosystem and Economic Accounts.

The proposal places the responsibility of the development of an environmental accounting system at the center of the environmental institutional framework, that is, on the Council of Ministers for Sustainability. In addition, it addresses the central components of an information system such as: the conceptual framework, the data model, the processes model, and the data infrastructure. In summary, an institutional structure is proposed for the development of a long-term system of environmental accounts.

The proposal considers the institutional reality of our country, and lays out a specific and realistic work plan for the next three years. This Plan not only includes the development of specific activities, such as the creation of pilot accounts, but what is most significant, it proposes the implementation of the institutional framework for the development of a national system of environmental accounts.

This document is a product of the work of several months in consultation with national and international experts. We thank them all for their important collaboration, and we are certain that this is the first step for a significant change in the development of the country's system of environmental statistics.

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7. ACRONYMS

ACHEE:	Chilean Agency for Energy Efficiency
BCCh:	Central Bank of Chile
CAPA:	Classification of Environmental Protection Activities and Expenditures
CCHEN:	Comisión Chilena de Energía Nuclear
CDB:	Convention on Biological Diversity
CEPAL/ECLAC:	Economic Commission for Latin America and the Caribbean
CI:	Integrated Accounts
CIIA:	Interinstitutional Committee for Environmental Information
CIICA:	Interinstitutional Committee for Environmental Information and Accounts
CIU/ISIC:	International Standard Industrial Classification of all Economic Activities
CIREN:	Natural Resource Information Center
COCHILCO:	Chilean Copper Commission
CONAF:	National Forestry Corporation
CMS:	Council of Ministers for Sustainability
CNE:	National Energy Commission
CNR:	National Irrigation Commission
CO₂:	Carbon dioxide
CPL:	National Council for Clean Production
DGA:	General Water Directorate
DGOP:	Directorate-General for Public Works
DIPRES:	National Budget Office
DIRECTEMAR:	General Directorate of the Maritime Territory and Merchant Marine
D.S.:	Supreme Decree
GEF:	Global Environment Facility
hea:	economic and/or environmental event
IDE/SDI:	Spatial Data Infrastructure
IEAG:	Expert Advisory Group on a Data Revolution for Sustainable Development
IEV/GGI:	Green Growth Indicators
IFOP:	Fisheries Development Institute
INDAP:	Institute of Agricultural Development
INE:	National Statistics Institute
INFOR:	Forest Institute
INIA:	National Agricultural Research Institute
MMA:	Ministry of the Environment
MINEDUC:	Ministry of Education
MINVU:	Ministry of Housing and Urbanism
OCDE/OECD:	Organization for Economic Cooperation and Development
ODEPA:	Agricultural Research and Policies Office
ODM/MDG:	Millennium Development Goals
ODS/SDG:	Sustainable Development Goals
ONEMI:	Office of National Emergency
OU/SU:	Supply an use
PIB/GDP:	Gross domestic product
PNCA/NEAP:	National Environmental Accounts Plan
PNUMA/UNEP:	United Nations Environment Programme
PR:	Production
RETC/PRTR:	Pollutant Release and Transfer Register

RM: Metropolitan Region of Santiago

SAG: Agriculture and Livestock Service

SCAE/: System of Environmental-Economic Accounting

SCAE-CEE: System of Environmental-Economic Accounting – Experimental Ecosystem Accounting

SCAE-MC: System of Environmental-Economic Accounting – Central Framework

SCN/SNA: System of National Accounts

SEA: Environmental Evaluation System

SEC: Superintendency of Electricity and Fuels

SECTRA: Executive Secretariat of Transport

SEEA: System of Environmental-Economic Accounting

SEEA-EEA: System of Environmental-Economic Accounting – Experimental Ecosystem Accounting

SEIA: System of Environmental Impact Assessment

SEN: National Statistic System

SEREMI: Regional Secretariat of the Ministry

SERNAGEOMIN: National Geology and Mining Service

SICAEE: System of Environmental, Ecosystem, and Economic Accounts

SII: Internal Tax Service

SIIA: Integrated System for Environmental Information

SINIA: National System of Environmental Information

SISS: Superintendency of Sanitation Services

SMA: Superintendence of the Environment

SNA: System of National Accounts

SNIT: National Land Information Coordination System

SPINCAM: Southeast Pacific Data and Information Network in support to Integrated Coastal Area Management

SERNAPESCA: National Fisheries and Aquaculture Service

SQL: Structured Query Language

ST: Stock

SUBDERE: Undersecretary of Regional Development

SUBPESCA: Undersecretary of Fishing and Aquaculture

TEEB: The Economics of Ecosystems and Biodiversity

TIC: Information and Communication Technologies

UCA: Unit of Environmental Accounts

UCE: Ecosystem Accounting Unit

UN: United Nations

UNSD: United Nations Statistics Division

UUFF: Physical units

UUMM: Monetary units



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