

Framework for the development of environmental statistics: The implementation in Mexico

Francisco.jimenez@inegi.org.mx



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Introduction

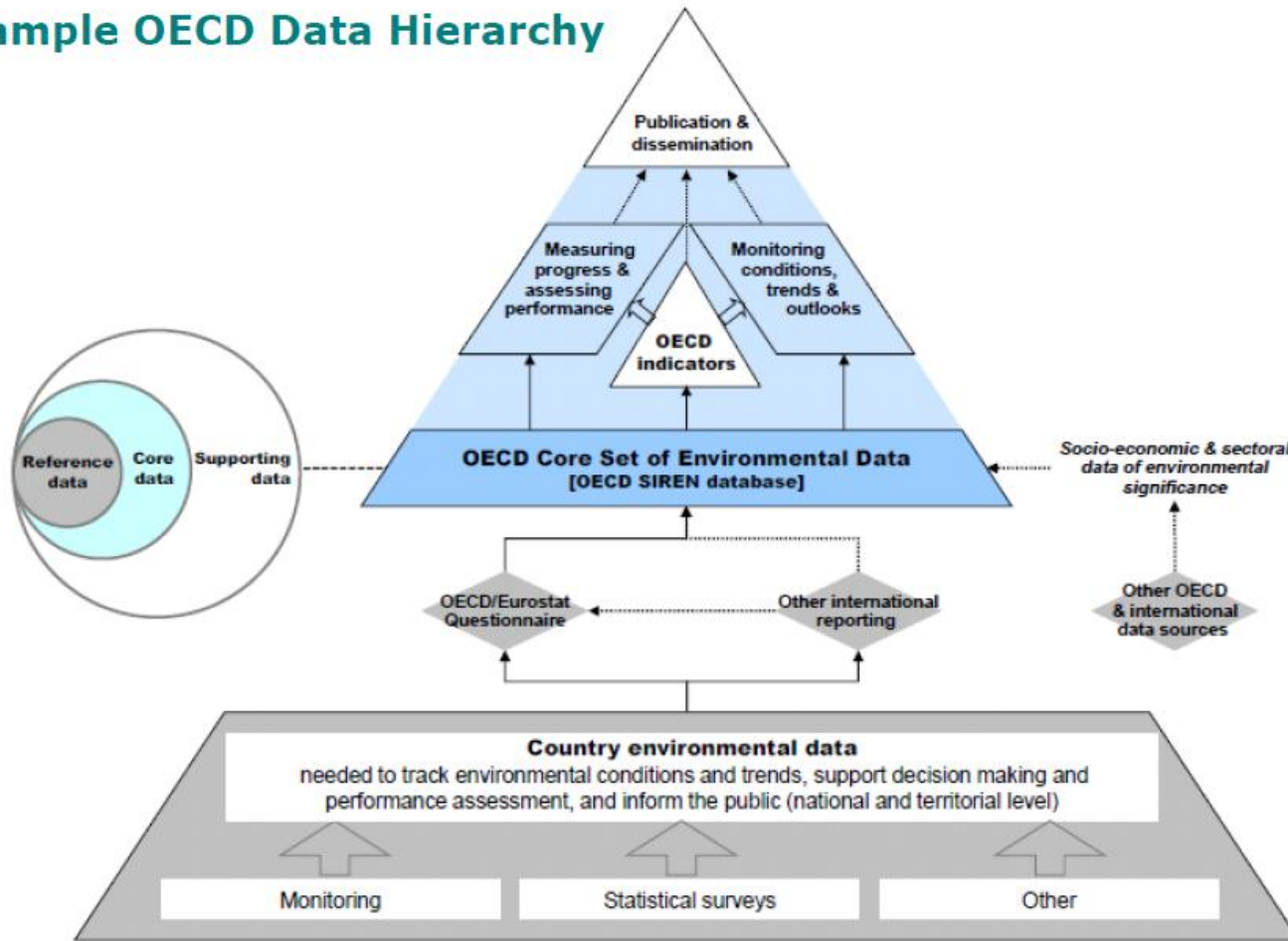
The knowledge of the diverse environmental components is of great importance for an harmonic coexistence human being-environment.

This situation is demanding the construction of environmental information systems that give the possibility of identify and quantify those components, the consequences of the environmental alteration and restoration.

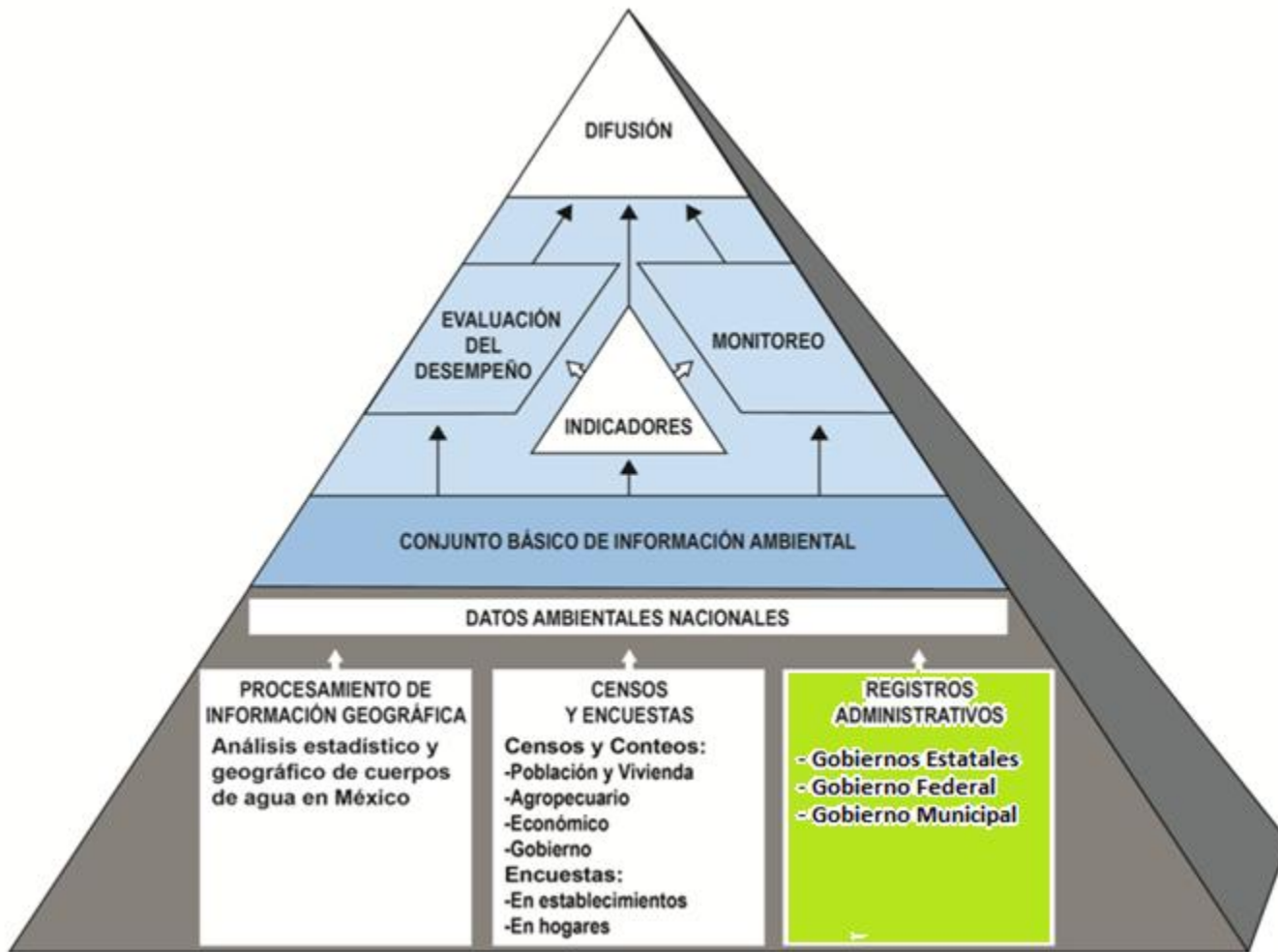


Introduction

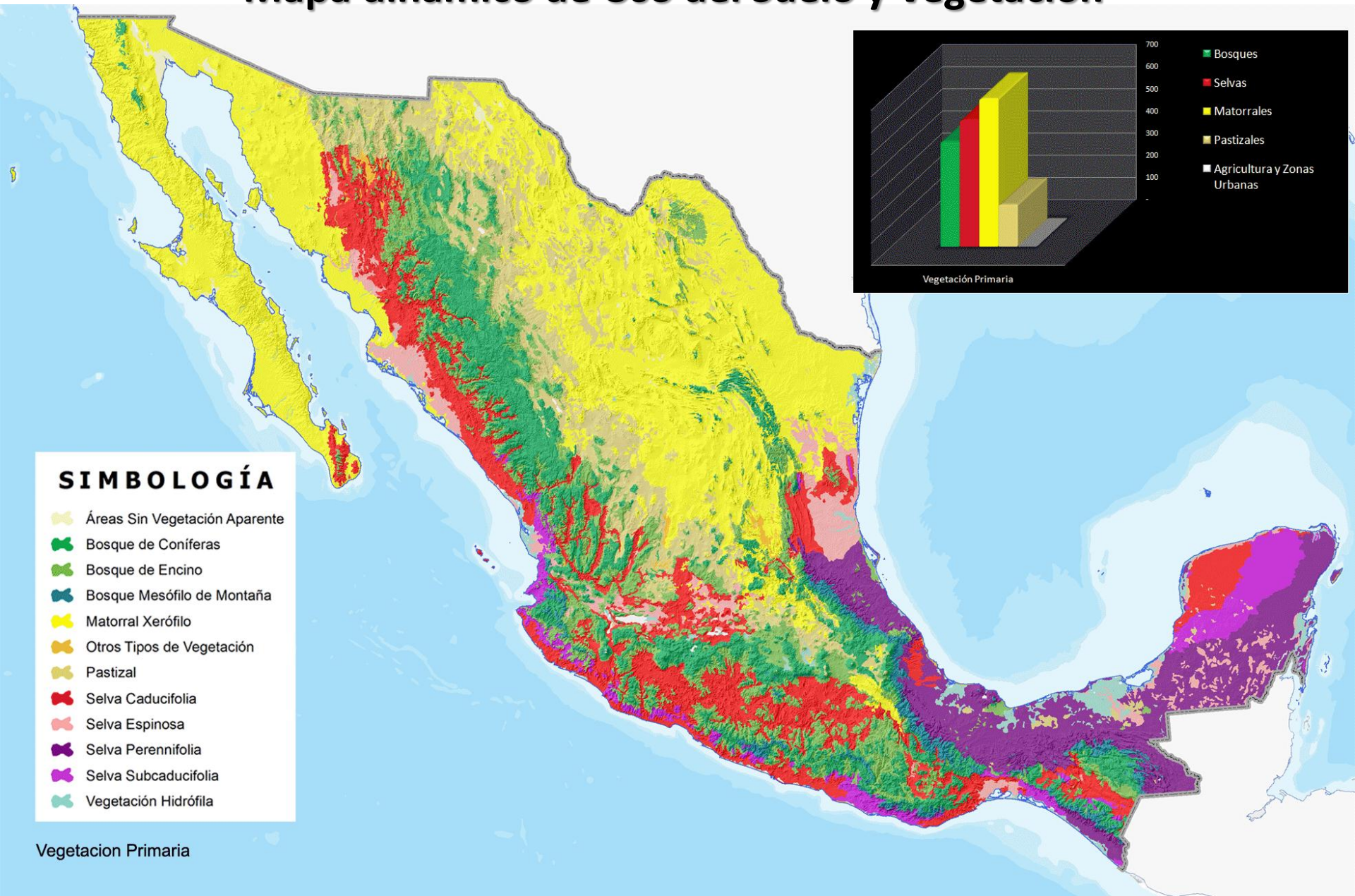
Example OECD Data Hierarchy



Introduction



Mapa dinámico de Uso del Suelo y Vegetación



SIMBOLOGÍA

- Áreas Sin Vegetación Aparente
- Bosque de Coníferas
- Bosque de Encino
- Bosque Mesófilo de Montaña
- Matorral Xerófilo
- Otros Tipos de Vegetación
- Pastizal
- Selva Caducifolia
- Selva Espinosa
- Selva Perennifolia
- Selva Subcaducifolia
- Vegetación Hidrófila

Vegetación Primaria

Sistema de consulta de Estadísticas Ambientales

Sistema de Consulta de Estadísticas Ambientales

Residuos sólidos urbanos Agua potable y saneamiento Área geográfica Nacional Ver mapa completo

Municipio: **Aguascalientes**
 Porcentaje de tomas respecto al total de tomas
 Cantidad: 45.39

Información del Módulo Ambiental Seleccionado
 P-084A
 Tipo: Fuente de Captacion de Agua
 Longitud: -102° 16' 54.3792 Latitud: 21° 54' 36.4428
[Ver Vista Panorámica](#)

Porcentaje de tomas tipo pozo respecto al total de tomas de la entidad

Mapas con estratificaciones
 Georreferenciación de elementos

Gráficos

07 Chiapas	871	868	323	254	5	5	2	0	3	55	106	106	195
02 Baja California	790	552	154	83	18	17	180	21	4	17	18	125	3155070
15 México	702	366	256	187	185	50	201	138	21	120	203	43	15175862
28 Tamaulipas	655	475	396	313	113	21	168	121	16	21	44	46	3268554
11 Guanajuato													5486372
21 Puebla			872	565	501	312	201	38	226	89	8	98	5779829
25 Sinaloa													2767761
09 Distrito Federal													8851080
27 Tabasco													2238603
16 Michoacán de Ocampo													4351037

Tablas con información estadística con despliegue estatal y municipal

http://mapserver.inegi.org.mx/dsist/ambiental/map/indexV3_FF.html

Background



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National System of Statistical and Geographical Information

The Geographical and Environmental Subsystem must describe the state and trends of the environment and produce and update information related to: Atmosphere, Water, Soil, Vegetation, Fauna, Wastes (urban and dangerous) among others. (Article 27 of the National System of Statistical and Geographical Information Law).



Environmental information availability in Mexico

DIAGNÓSTICO INEGI 2006

Estadísticas matriz ONU		Disponibilidad México	
Categoría	VARIABLES	Número	%
PRESIÓN	123	82	66.7
ESTADO	55	32	58.2
RESPUESTA	93	52	55.9
TOTAL	271	166	61.3

* Incluyen temas Agua, Atmósfera, Suelos y Residuos; no incluye Fauna y Flora, ni A. humanos.

The lack of environmental data in Mexico was estimated in approximately 40 percent in both exercises.

DIAGNÓSTICO SEMARNAT-INEGI 2008

Indicadores matriz OCDE		Disponibilidad México	
Categoría	VARIABLES	Número	%
PRESIÓN	46	35	76
ESTADO	31	17	55
RESPUESTA	32	17	53
TOTAL	109	69	63

*The information on **State and Response** of the environment were the main gaps detected.*

Fuente: INEGI/SEMARNAT. Con base en la confronta entre la información disponible y la matriz de OCDE: *OECD Environmental Indicators 2005 (Environment at a Glance)*, París, 2005. (Actualización: DGGMA/DGAEMA/DMA, Julio 2009).



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Framework for the development of Environmental Statistics: Pilot study



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Objectives of the Pilot study

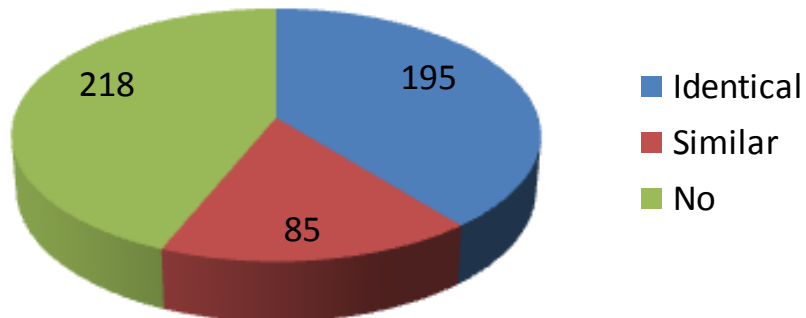
- ❖ To assess the relevance of the statistical topics ;
- ❖ To compare the basic environmental statistic data set, in order to identify gaps ;
- ❖ To identify the reasons for the lack of data.



Results of the FDES pilot test in Mexico

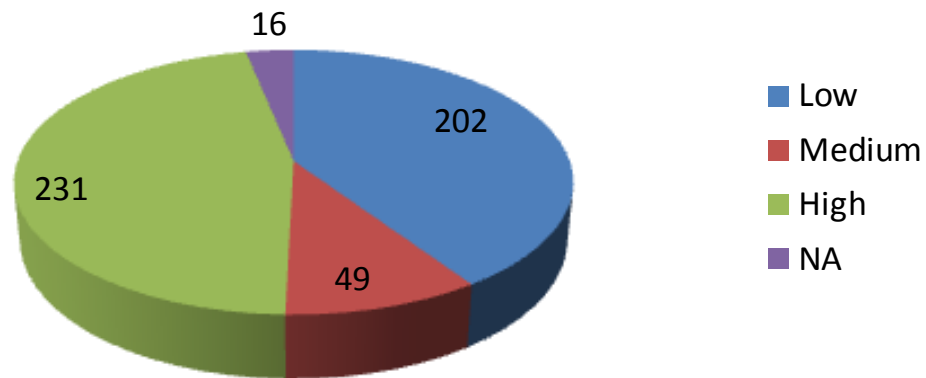
Global results on coverage

The way environmental statistics are produced



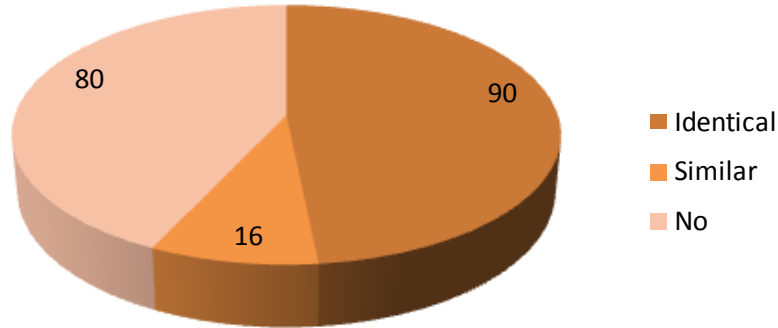
Global results on priority

Priority on data collection

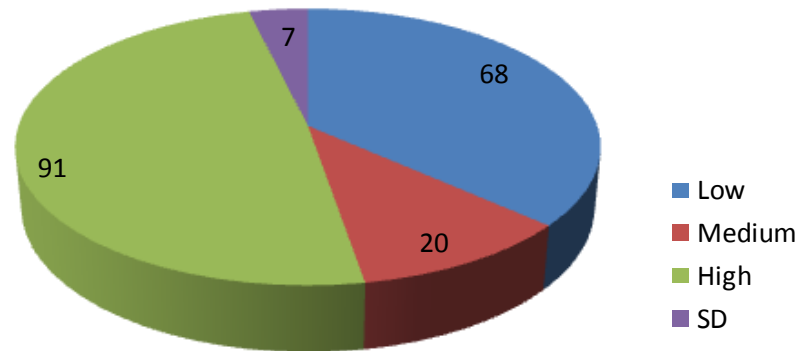


Component 1: Environmental Conditions and Quality

Coverage

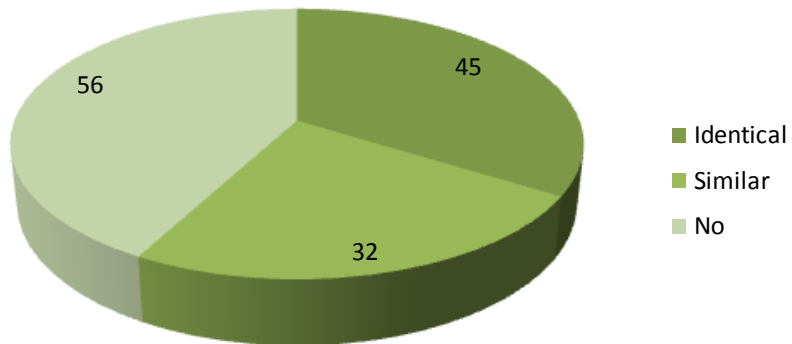


Priority

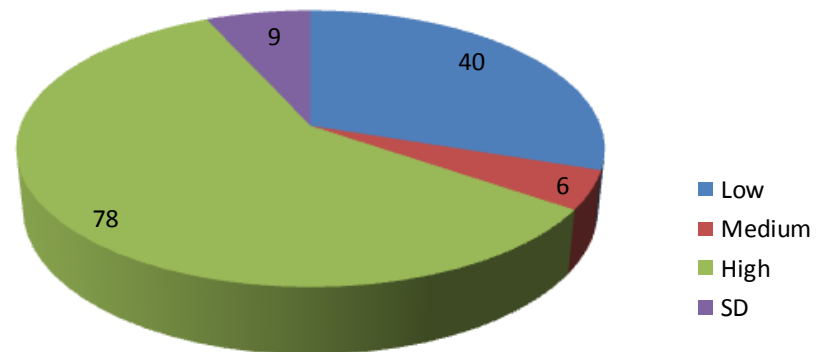


Component 2: Environmental Resources and their Use

Produce actualmente estadísticas ambientales

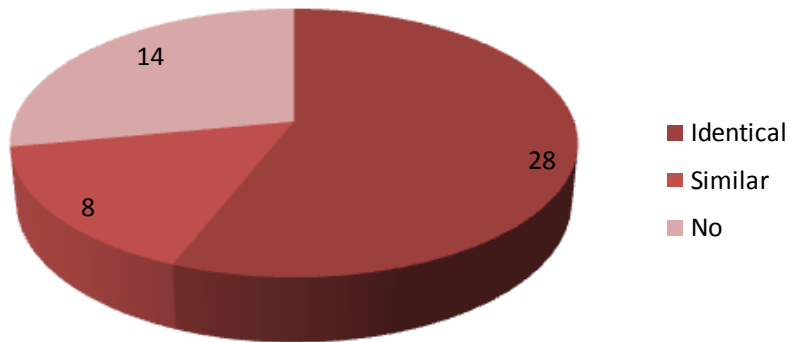


Prioridad para la recolección de datos nacionales

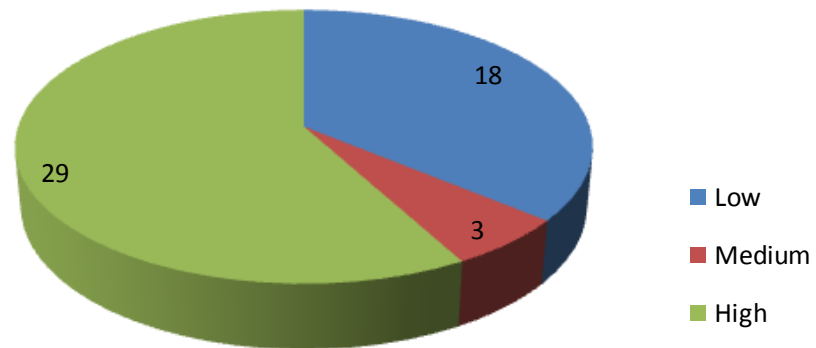


Component 3: Emissions, Residuals and Waste

Produce actualmente estadísticas ambientales

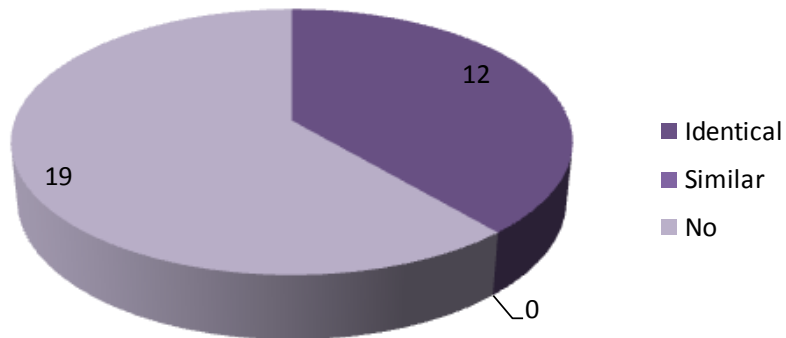


Prioridad para la recolección de datos nacionales

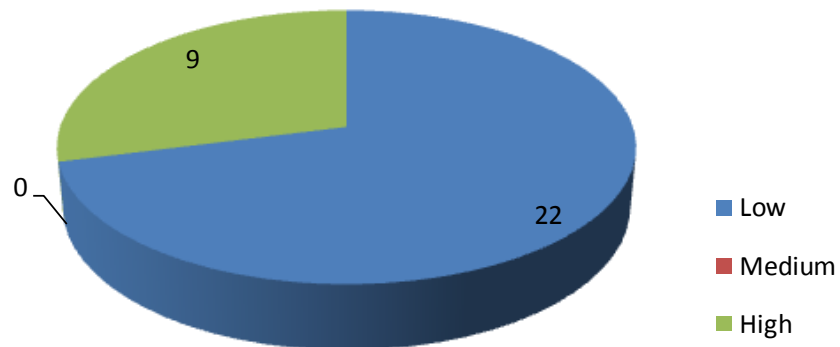


Component 4: Extreme Events and Disasters

Produce actualmente estadísticas ambientales

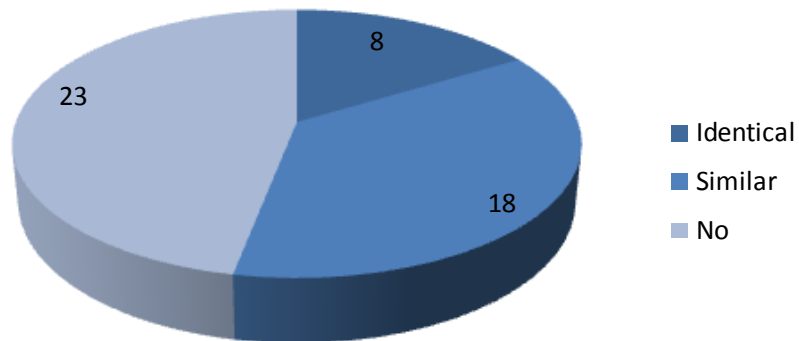


Prioridad para la recolección de datos nacionales

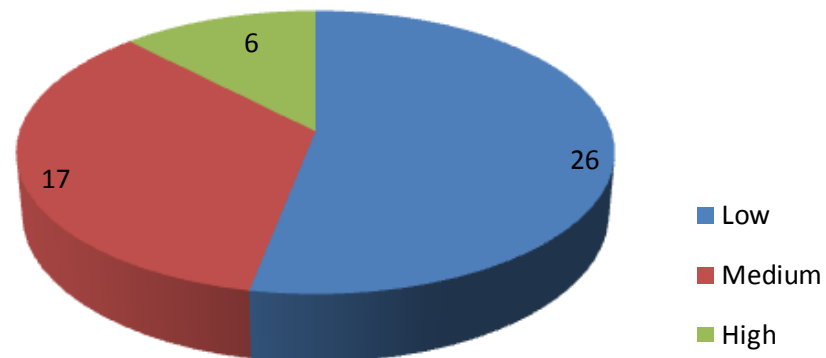


Component 5: Human Habitat and Environment Health

Produce actualmente estadísticas ambientales

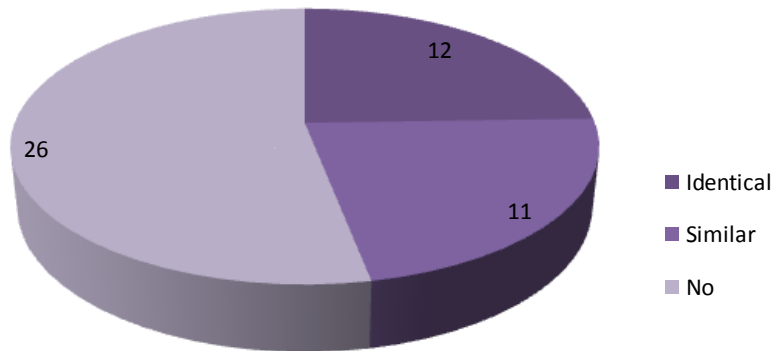


Prioridad para la recolección de datos nacionales

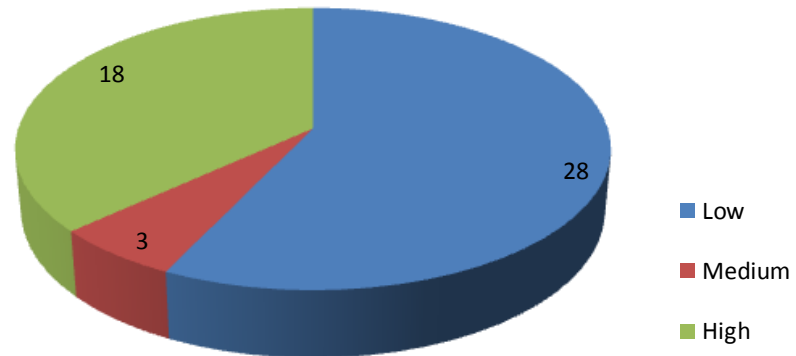


Component 6: Environment Protection, Management and Engagement

Produce actualmente estadísticas ambientales



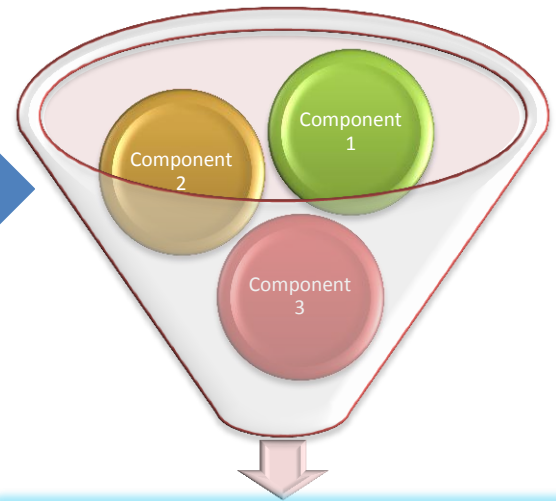
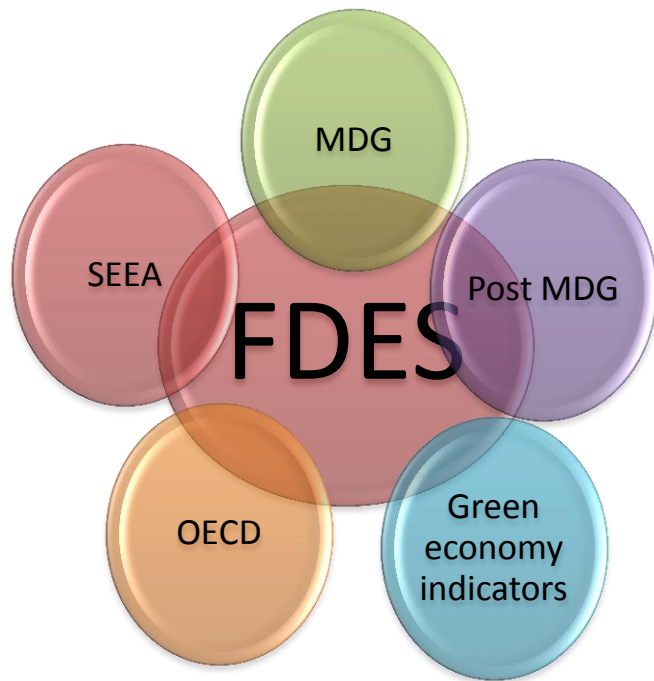
Prioridad para la recolección de datos nacionales



Analysis



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Nacional framework proposal



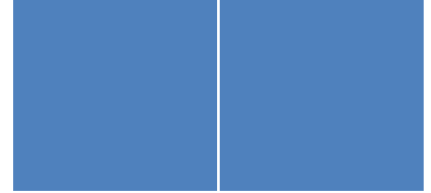
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Results



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Component 1: Environmental Conditions and Quality			
Topic 1.1.1: Atmosphere, climate and weather	a. Temperature	1. Annual averages 2. Long-term annual averages 3. Monthly averages 4. Annual minimum and maximum monthly average	
	b. Precipitation	1. Annual averages 2. Long-term annual averages 3. Monthly averages 4. Annual minimum and maximum monthly average	
	c. Humidity	1. Annual averages 2. Long-term annual averages	
	d. Pressure	1. Annual averages 2. Long-term annual averages 3. Monthly averages 4. Annual minimum and maximum monthly average	
	e. Wind speed	1. Annual averages 2. Long-term annual averages	
	f. Solar radiation	1. Annual averages 3. Monthly averages	
	h. Occurrence of El Niño, La Nina events, where appropriate	1. Occurrence	
	Topic 1.1.2: Hydrographic characteristics	a. Lakes	1. Surface area 2. Location
		b. Rivers	1. Surface area 2. Location
		c. Reservoirs	1. Length 2. Surface area 3. Location
d. Watersheds		1. Description of main watersheds	
e. Seas		1. Surface area of territorial waters or EEZ 3. Location	
f. Groundwater		1. Extent of aquifers	
Topic 1.1.3: Geological and geographic information	a. Geologic, geographic and geomorphologic conditions of terrestrial areas and islands	1. Length of border 2. Area of country or region 3. Geographical location 4. Number of islands 5. Area of islands 6. Location of islands 8. Spatial distribution of land relief 9. Characteristics of landforms (e.g., location, area and height, as applicable, for plains, hills, plateaus, dunes, volcanoes, mountains, sea mounts, etc.) 10. Area of rock types 11. Location of rock types 12. Area of tectonic plates 13. Location of tectonic plates 14. Length of fault lines 15. Location of fault lines	
	b. Coastal area (includes area of coral reefs, mangroves, etc.) (also in 2.3.1.c)		
	c. Main sea's characterization	1. Length of marine coastline 2. Territorial waters 3. EEZ 2. Sea level	
	Topic 1.2.1: Soil characteristics	a. Soil characterization (also in 2.4.1.a-c)	1. Area of soil types
		b. Degradation (also in 2.4.1.a-c)	1. Area affected by soil erosion 2. Area affected by desertification 3. Area affected by salinization 4. Area affected by waterlogging 5. Area affected by acidification
		c. Nutrient content of soil (also in 2.4.1.a-c), measured in levels of:	1. Nitrogen (N) 2. Phosphorous (P) 3. Calcium (Ca) 4. Magnesium (Mg) 5. Potassium (K) 6. Zinc (Zn)
	Topic 1.2.2: Land cover	a. Extent and spatial distribution of main land cover categories (also in 1.3.3.b)	1. Area of land cover by land cover categories 2. Location of land cover categories
	Topic 1.3.1: Biodiversity	a. Flora - terrestrial, freshwater and marine (also in 1.3.2.c)	1. Number of known species by status category 2. Species population 3. Number of endemic species 4. Number of invasive alien species 5. Habitat fragmentation
		b. Fauna - terrestrial, freshwater and marine (also in 1.3.2.c)	1. Number of known species by status category



Component 2: Environmental Resources and their Use		
Topic 2.1.1: Stocks and changes of non-energy mineral resources	a. Non-energy mineral resources	1. Stocks of commercially recoverable resources by mineral 2. New discoveries 5. Extraction
Topic 2.1.2: Extraction of non-energy mineral resources and related activities	a. Non-energy mineral imports by mineral b. Non-energy mineral exports by mineral c. Volume of non-energy minerals extracted by mineral	
	a. Mineral energy resources	1. Stocks of commercially recoverable resources by type of resource 2. New discoveries 3. Upward reappraisals 4. Upward reclassifications 5. Extraction 7. Downward reappraisals 8. Downward reclassifications 9. Stocks of potentially commercially recoverable resources 10. Stocks of non-commercial and other known resources
Topic 2.2.1: Stocks and changes of mineral energy resources		
Topic 2.2.2: Extraction and trade of mineral energy resources	a. Volume of energy minerals extracted by type of resource b. Exports/imports of energy minerals by type of resource c. Inventories of non-renewable energy mineral resources	
Topic 2.2.3: Production and use of energy	a. Renewable and non-renewable production of energy b. Production of energy c. Total consumption of energy d. Electric energy	1. Total 2. Non-renewable 3. Renewable 1. Primary energy production 2. Secondary energy production 1. Electricity production 2. Installed capacities
Topic 2.3.1: Land use	a. Land area by land use categories b. Area of inland waters by use categories c. Coastal area by use categories (includes area of coral reefs, mangroves, etc.) (also in 1.1.3.b) f. Land Ownership i. Area of land under agroforestry	
Topic 2.3.2: Land use changes	a. Land use change	1. Increase of area within category 2. Decrease of area within category 3. Change of land use category by origin and destination
Topic 2.4.1: Soil resources	a. Soil type (also in 1.2.1) b. Soil quality (also in 1.2.1) c. Soil lost due to erosion (also in 1.2.1)	1. Area of soil types 1. Area of soil by quality categories 1. Area of soil
Topic 2.5.1: Timber resources and their use	a. Timber resources c. Forest production	1. Stocks of timber resources
Topic 2.5.2: Aquatic resources and their use	a. Fish capture production b. Aquaculture production c. Imports of fish and fishery products d. Exports of fish and fishery products f. Fish resources (natural; cultivated)	1. Stocks of fish resources
Topic 2.5.3: Crops	a. Main annual and perennial crops c. Monoculture / resource-intensive crops d. Amount of crops imported e. Amount of crops exported	1. Area harvested 2. Amount produced 3. Amount of genetically modified crops produced 1. Area being used for production 2. Amount produced 3. Amount of genetically modified crops produced
Topic 2.5.4: Livestock	a. Livestock c. Imports of livestock d. Exports of livestock	1. Number of live animals
Topic 2.5.5: Wild, uncultivated biological resources (other than fish and timber)	a. Permits for regulated hunting of wild animals c. Reported wild animals killed or trapped for food or sale d. Gathering of non-wood forest products and other plants	1. Number of permits issued per year
Topic 2.6.1: Water resources	a. Inflow of water to inland water resources b. Outflow of water from inland water resources c. Inland water stocks	1. Precipitation 2. Inflow from neighbouring territories 1. Evapotranspiration 2. Outflow to neighbouring territories 1. Surface water stocks in artificial reservoirs 2. Surface water stocks in lakes 3. Surface water stocks in rivers and streams 6. Groundwater stocks 7. Water rights



Component 3: Emissions, Residuals and Waste				
Topic 3.1.1: Emissions of greenhouse gases	a. Total emissions of direct greenhouse gases, by activity:	1. Carbon dioxide (CO₂) 2. Methane (CH₄) 3. <i>Nitrous oxide (N₂O)</i> 4. <i>Perfluorocarbons (PFCs)</i> 5. <i>Hydrofluorocarbons (HFCs)</i> 6. <i>Sulphur hexafluoride (SF₆)</i>		
	b. Total emissions of indirect greenhouse gases, by activity:	1. Sulphur dioxide (SO₂) 2. Nitrogen oxides (NO_x) 3. <i>Non-Methane Volatile Organic Compounds (NM-VOCs)</i> 4. <i>Other</i>		
	Topic 3.1.2: Consumption of ozone depleting substances	a. Consumption of ozone depleting substances (ODS), by substance:	1. Chlorofluorocarbons (CFCs) 2. Hydrochlorofluorocarbons (HCFCs) 3. <i>Bromofluorocarbons</i> 4. <i>Methyl chloroform</i> 5. <i>Carbon tetrachloride</i> 6. <i>Methyl bromide</i>	
		Topic 3.2.2: Collection and treatment of wastewater	a. Volume of wastewater collected	
			b. Volume of wastewater treated	
			c. Population connected to wastewater collection	
d. Population connected to wastewater treatment				
e. Total urban wastewater treatment capacity			1. Number of plants 2. Capacity of plants	
f. Total industrial wastewater treatment capacity	1. Number of plants 2. Capacity of plants			
Topic 3.2.3: Discharge of wastewater to the environment	a. Wastewater discharge	1. Total volume of wastewater discharged to the environment after treatment 2. Total volume of wastewater discharged to the environment without treatment		
	c. Generation of hazardous waste	1. Hazardous waste generated		
Topic 3.3.2: Management of waste	a. Municipal waste	1. Total municipal waste collected 2. Amount of municipal waste by type of treatment 3. <i>Number of municipal waste treatment and disposal facilities</i> 4. <i>Capacity of municipal waste treatment and disposal facilities</i>		
	b. Hazardous waste	1. Total hazardous waste collected 2. Amount of hazardous waste by type of treatment 3. <i>Number of hazardous waste treatment and disposal facilities</i> 4. <i>Capacity of hazardous waste treatment and disposal facilities</i>		
	c. Other/industrial waste	1. <i>Total collected</i> 2. <i>Amount treated by type of treatment</i> 3. <i>Number of treatment and disposal facilities by type of treatment</i> 4. <i>Capacity of industrial waste treatment and disposal facilities</i>		
	d. <i>Amount of recycled waste by waste category</i>			
	f. <i>Import and export of hazardous waste</i>			



Component 4: Extreme Events and Disasters		
Topic 4.1.1: Occurrence of natural extreme events and disasters	a. Occurrence of natural extreme events and disasters:	1. Type of natural disaster 2. Location 3. Magnitude (where applicable) 4. Date of occurrence 5. Duration 6. <i>Hazard prone areas</i> 7. <i>Population living in hazard prone areas</i>
Topic 4.1.2: Impact of natural extreme events and disasters	a. People affected by natural extreme events and disasters	1. Number of people killed 2. Number of people injured 3. Number of people homeless 4. Number of people affected
	b. Economic loss due to natural extreme events and disasters	
	c. Effects of natural extreme events and disasters on integrity of ecosystems	1. <i>Area affected by natural disasters</i> 2. <i>Loss of vegetation cover</i>
	d. <i>External assistance received</i>	
Topic 4.2.1: Occurrence of technological disasters	a. Occurrence of technological disaster	1. Type of disaster 2. Location 3. Date of occurrence 4. Duration
Topic 4.2.2: Impact of technological disasters	a. People affected by technological disaster	1. Number of people killed 2. Number of people injured 3. Number of people homeless 4. Number of people affected
	b. Economic loss due to technological disaster	
	c. Effects of disasters on integrity of ecosystem	1. <i>Area affected by technological disasters</i> 2. <i>Loss of vegetation cover</i> 3. <i>Effect on watershed area</i> 4. <i>Other (e.g., for oil spills: volume of oil released into the environment, impact on ecosystem)</i>
	d. <i>External assistance received</i>	



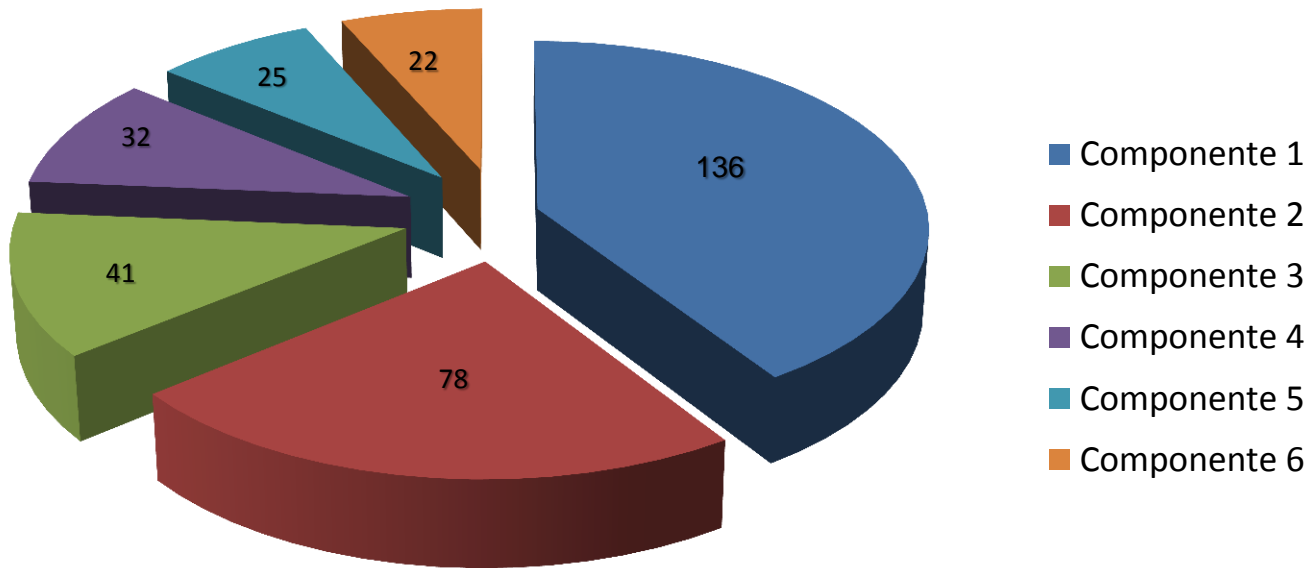
Component 5: Human Habitat and Environmental Health		
Topic 5.1.1: Urban and rural population	a. Total population living in urban areas	
	b. Total population living in rural areas	
	c. Total urban area	
	d. Total rural area	
Topic 5.1.2: Water and sanitation	a. Population using an improved drinking water source	
	b. Population using an improved sanitation facility (urban and rural)	
	c. Population served by municipal waste collection (urban and rural)	
Topic 5.1.3: Housing conditions	a. Urban population living in slums	
Topic 5.1.5: Other urban habitat concerns	Available green areas	
Topic 5.2.1: Airborne diseases and conditions	a. Airborne diseases and conditions (e.g., upper and lower respiratory disease, obstructive pulmonary disease, asthma and allergic rhinitis):	1. Incidence 2. Morbidity 3. Mortality
Topic 5.2.2: Water-related diseases and conditions	a. Water-related diseases and conditions (e.g., diarrhoeal disease, gastroenteritis and water borne parasite infections):	1. Incidence 2. Morbidity 3. Mortality
Topic 5.2.3: Vector borne diseases	a. Vector borne diseases (e.g., malaria, dengue fever, yellow fever and Lyme disease):	1. Incidence 2. Morbidity 3. Mortality
Topic 5.2.4: Health problems associated with excessive UV radiation exposure	a. Problems associated with excessive UV radiation exposure (e.g., skin cancer, cataracts):	1. Incidence 2. Morbidity 3. Mortality
Topic 5.2.5: Toxic substance related diseases and conditions	a. Toxic substance related diseases and conditions (e.g., chronic illnesses of the respiratory system; infertility; and congenital anomalies or malformations), including nuclear radiation related health problems (e.g., short and long term health problems including radiation sickness or "atomic disease", leukaemia, lung cancer, thyroid cancer and cancer of other organs, sterility and congenital anomalies or malformations):	1. Incidence 2. Morbidity 3. Mortality
	7.11. Proporción de ocupantes en viviendas particulares que usa carbón o leña para cocinar	



Component 6: Environment Protection, Management and Engagement		
Topic 6.1.1: Government environment protection and resource management expenditure	a. Government environment protection and resource management expenditure	<ol style="list-style-type: none"> Annual government environment protection expenditure by purpose <i>Annual government resource management expenditure by purpose</i>
Topic 6.2.1: Institutional strength	a. Environmental institutions and their resources	<ol style="list-style-type: none"> Name of the main environmental authority/agency and year of establishment Annual budget of main environmental authority/agency Number of staff of main environmental authority/agency
Topic 6.2.2: Environmental regulation and instruments	a. Direct regulation	<ol style="list-style-type: none"> List of regulated pollutants and description (e.g., by year of adoption and maximum allowable levels) Description (e.g., name, year established) of licensing system to ensure compliance with environmental standards for businesses or other new facilities <i>Number of applications for licenses received and approved per year</i>
	b. Economic instruments	<ol style="list-style-type: none"> <i>List and description (e.g., year of establishment) of green/environmental taxes</i> <i>List and description (e.g., year of establishment) of environmentally relevant subsidies</i> <i>List of eco-labelling and environmental certification programmes</i>
Topic 6.2.3: Participation in MEAs and environmental conventions	a. Participation in MEAs and other global environmental conventions	<ol style="list-style-type: none"> List and description (e.g., year of participation of country) of MEAs and other global environmental conventions
Topic 6.3.1: Disaster preparedness and management for natural disasters and extreme events	a. National natural disaster and extreme event preparedness and management systems	<ol style="list-style-type: none"> Existence of national disaster plans/programmes Description (e.g., number of staff) of national disaster plans/programmes <i>Existence of early warning systems for all major hazards</i> <i>Expenditure on disaster prevention, preparedness, clean-up and rehabilitation</i>
Topic 6.4.1: Environmental information	a. Environmental information systems	<ol style="list-style-type: none"> Existence of publicly accessible environmental information system
	b. Environment statistics	<ol style="list-style-type: none"> Description of national environment statistics programmes (e.g., existence, year of establishment, lead agency, human and financial resources) <i>Number and type of environment statistics products and periodicity of updates</i> <i>Existence and number of participant institutions in interagency environment statistics platforms or committees</i>
Topic 6.4.2: Environmental education	a. Environmental education	<ol style="list-style-type: none"> <i>Allocation of resources by central and local authorities for environmental education</i>
Topic 6.4.3 Environmental Engagement	a. Environmental engagement	<ol style="list-style-type: none"> Participation in pro-environment activities



Variables por Componente FDES



	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6	Total
Tier 1	35	35	19	4	11	3	107
Tier 2	83	46	33	12	17	21	212
Tier 3	64	43	5	17	21	23	173
Total	182	124	57	33	49	47	492

Conclusions y perspectives



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Los resultados que arroja este análisis muestran la necesidad de mejorar la generación y disponibilidad de estadísticas ambientales en sus diferentes parámetros: cobertura temática, temporalidad, alcance geográfico y calidad.



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Subsanar estas deficiencias de la estadística ambiental constituye uno de los retos fundamentales del Sistema Nacional de Información Estadística y Geográfica.

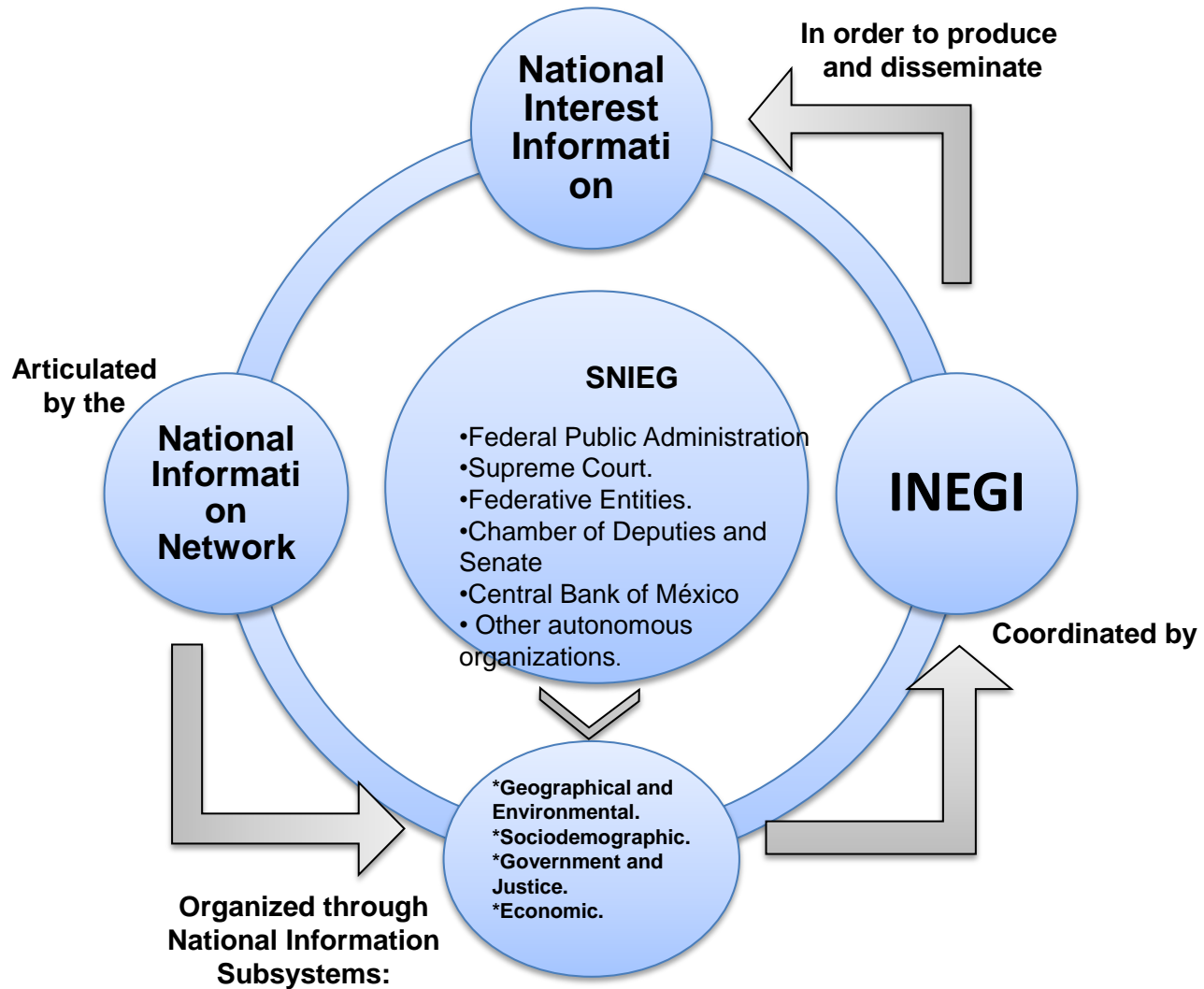


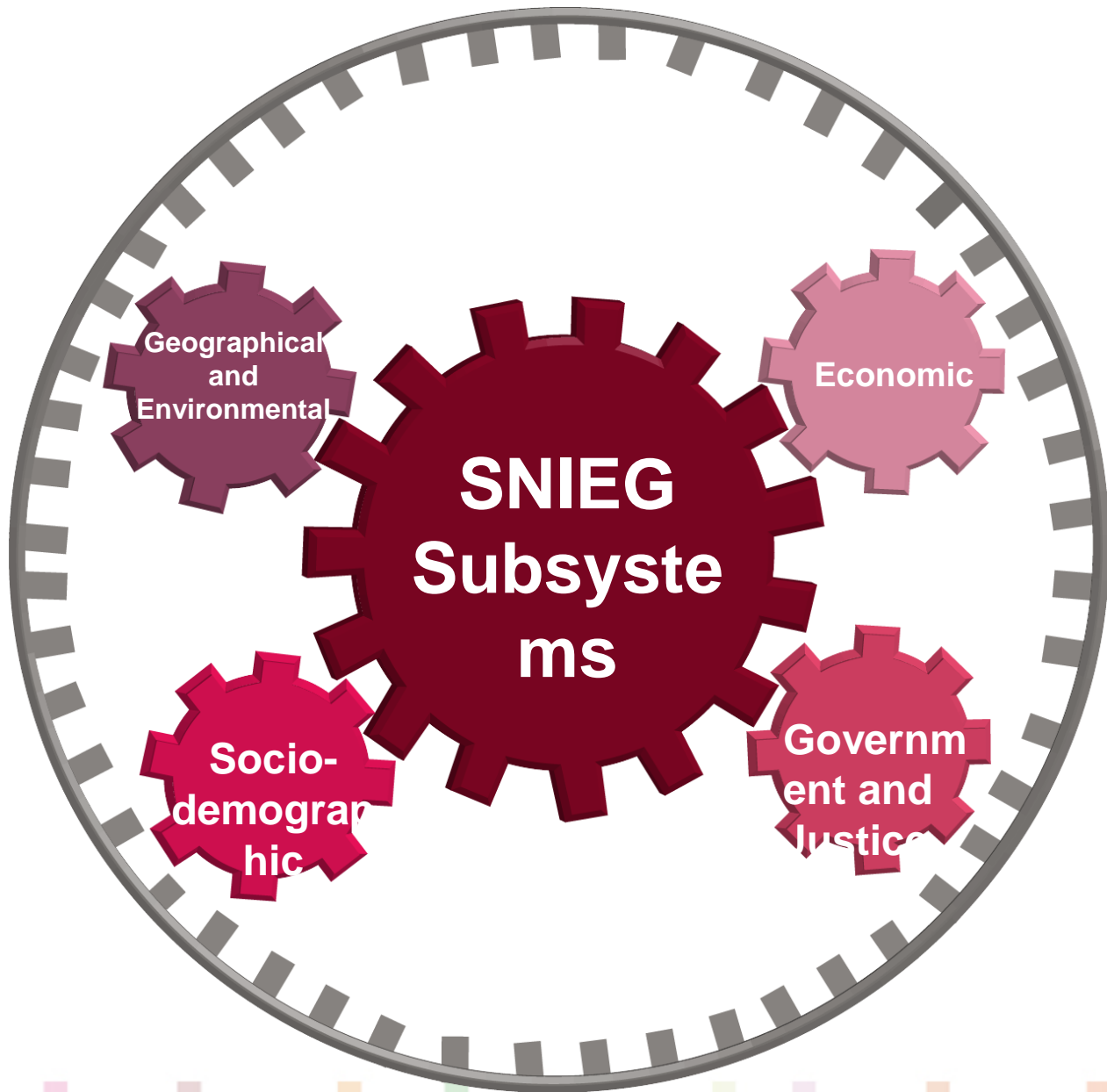
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Para atender esta situación será indispensable la participación de las instancias colegiadas, particularmente los Comités Técnicos Especializados a nivel federal y estatal.



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Geographical
and
Environmental

Economic

SNIEG
Subsystems

Socio-
demographic

Government
and
Justice



The Subsystems

