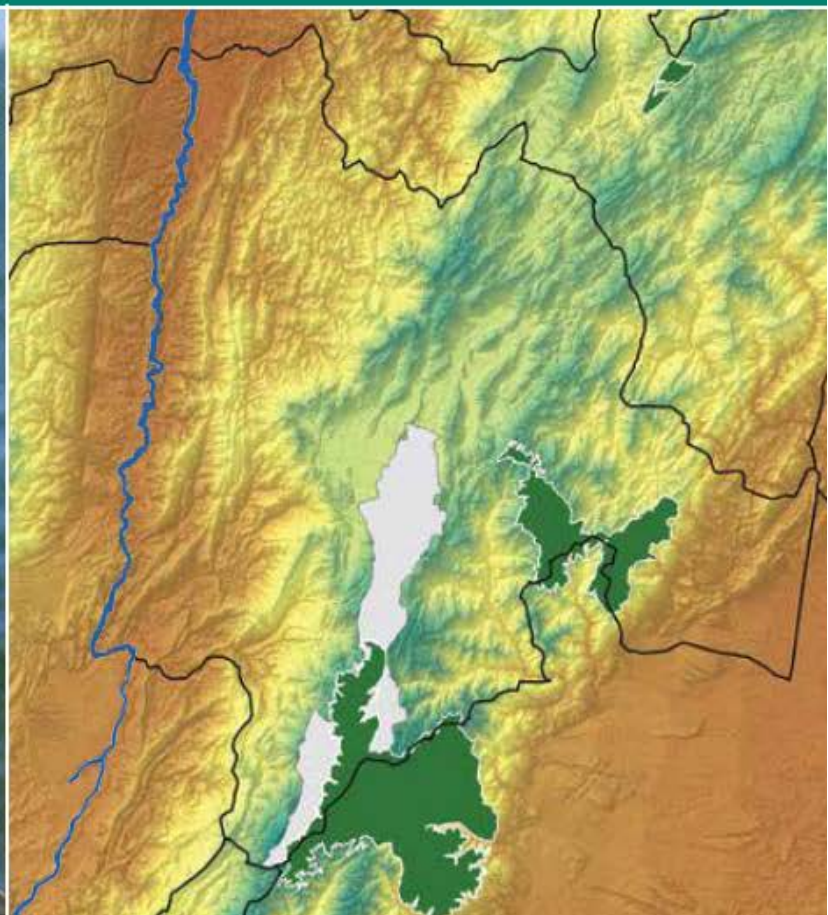
United Nations Development Programme

ARE WE COUNTING ON NATURE?

An Analysis of Spatial Data included in Post-2010 National Biodiversity Strategies and Action Plans and 5th National Reports from 135 Countries



Are We Counting on Nature? An Analysis of Spatial Data included in Post-2010 National Biodiversity Strategies and Action Plans and 5th National Reports

Background

As part of their commitment to the Convention on Biological Diversity[1], governments have been developing National Biodiversity Strategy and Action Plans (NBSAPs) and National Reports since shortly after the Convention was ratified in 1992. When the first National Reports began to be submitted in 1997, the world of technology was very different from today. Some of these were typed on a typewriter; some were saved on 5" floppy disks; and many were faxed to the CBD Secretariat, page by page. Some included budget line items for purchasing external modems required to access the internet, and some included staff trainings on "'how to use the internet." Only a tiny handful of these plans or reports included any spatial maps, and those that did, generally included only maps of national boundaries.

Much has changed in the world of data and technology over the past 20 years. Almost half of the world now has internet access, satellite imagery covers the entire planet, we produce 925 quintillion bytes of data every year--90% of all of the world's data was created in the past two years, and big data – especially geospatial data with geographic information – is changing the way that the world thinks about and uses information in real time. Much has also changed in the world around us; in the last 20 years, we have added 1.6 billion people to the planet, while losing 20% of the world's wilderness, and exploiting or exhausting 90% of all fisheries. As we look toward 2030, the population will continue to expand by more than 1.2 billion people and we will also be looking at a food-water-energy nexus, where demand for food will increase by 35%, for water by 40%, and for energy by 50%. Our urban footprint is expected to triple, having profound impacts on biodiversity.

Because of the trends in biodiversity decline and increased pressure, conserving ecosystem services will be critical to sustaining the world's population through the provision of food, water, jobs, livelihoods and protection from climate, especially for the poor and vulnerable. The importance of biodiversity and ecosystem services to development is reflected in the recently adopted Sustainable Development Goals (SDGs), with a preamble that states the importance of decoupling economic growth from environmental loss, and avows that "we are determined to protect the planet from degradation…so that it can support the needs of the present and future generations." The specific contributions of biodiversity to multiple SDGs are reflected in a recent multi-agency policy brief called "Biodiversity and the 2030 Agenda for Sustainable Development," which outlines how the strategies within an NBSAP allow governments to not only achieve the Aichi Biodiversity Targets, but to also simultaneously achieve many of the Sustainable Development Goals (SDGs) and their targets, well beyond Goals 14 and 15.

But in order to deliver essential services, ecosystems must be adequately managed, and for this, adequate data is essential. A recent report called A World that Counts: Mobilising the Data Revolution for Sustainable Development highlights the importance of data, calling it "the lifeblood of decision making." Without high-quality data, the authors write, it is almost impossible to design, monitor and evaluate effective policies. They also note that while the vast new world of geospatial data will enable policy makers to accelerate

[1] The Convention on Biological Diversity provides a framework for countries to take action and report progress on implementation in conserving, sustainably using, and equitably sharing the benefits of biodiversity. Three articles of the Convention have particular relevance for this framework. Article 26 obliges each Party to report on measures that it has taken to implement the Convention through a National Report. Article 6 describes the primary instrument of implementation of the Convention at the national level – the National Biodiversity Strategies and Action Plan (NBSAP). Article 10(a) obliges Parties to integrate conservation and sustainable use into national decision-making processes.

implementation of the Sustainable Development Goals, there are striking gaps between the *potential* for data to be used in the implementation of SDGs, and the *actual capacity* of countries to use data for effective decision making, with the most notable gaps found between developed and developing countries and between private companies and public agencies. Furthermore, they note that data on key social and economic dimensions of the Sustainable Development Goals, including poverty, gender, access to water, health, and climate vulnerability, among many other dimensions, are rarely integrated into sectoral analyses, preventing action that could tackle SDG targets more efficiently.

Now that the latest round of NBSAPs and 5th National Reports has mostly been submitted – more than 140 countries have completed their post-2010 NBSAPs, and more than 180 countries have completed their 5th National Reports – it is timely to analyze the how these recent submissions differ from those reports that were submitted twenty years ago. Specifically, this report asks: How have these plans and reports evolved from the first round of NBSAPs and National Reports? To what extent do they reflect the data revolution that is occurring all around us? To what extent do they use and include spatial data? How well are socio-economic dimensions of the Sustainable Development Goals integrated into the data? And how well do these plans and reports include the data required to enable planners to make the critical decisions needed to manage nature for development – to serve as 'the lifeblood of decision making"?

Method

To answer these questions, our team analyzed the number and type of all maps included in post-2010 NBSAPs and 5th National Reports from developing countries.[2] We used the presence and types of spatial maps as a proxy for the degree to which a country is utilizing geospatial data for decision making, recognizing that many countries may be using spatial data for decision making, and not including this information in their reports. We categorized each map, using a taxonomy that we developed during the analysis (see Table 1). As part of this process, we also characterized each category of map as non-actionable, potentially actionable, and actionable as defined below:

a) **Non-actionable data layers**: these included any maps that were unlikely to be useful, either in isolation or combined with other data layers, to answer key questions associated with the Aichi Biodiversity Targets or with biodiversity-relevant SDGs. Examples included national boundary, political maps, and basic variables and features.[3]

b) **Potentially actionable data layers**: these included any maps that could potentially be useful to planners in taking action, but only when these data layers were combined with other data layers to yield new information. Examples of potentially actionable data layers include forest cover, existing protected areas, distribution of key biodiversity areas, habitat intactness, and population density, among others.

c) **Actionable data layers**: these included any maps that provided information that allowed planners to take action. Examples included a single-layer map, such as proposed new protected areas, or coastal vulnerability, and composite maps, such as the intersection of key biodiversity areas and unprotected lands. Each of these provided places on the land or in the water that allowed decision makers to develop priorities and to take action.

[2] The NBSAPs and National Reports included all developing country submissions that were available as of March 1, 2017. We analyzed 145 5th National Reports, and 109 NBSAPs.

[3] We categorized maps with some variables, such as slope and precipitation, as non-actionable. Even though it is possible to combine such layers to create actionable maps, such as topographic indices, we saw no evidence, hence categorized these maps as non-actionable.

Table 1: Taxonomy used to characterize types of maps in NBSAPs and 5th National Reports

Characteristic of data layer	Taxonomic description	Examples from maps included in post-2010 NBSAPs and 5th National Reports
Non-actionable data layers	Basic variable or feature	Geological history map; location map of country; mountains; national map; physiographic map; precipitation; slope; temperature; topography; volcano;
	Policy and management	Administrative regions; district and regions
Potentially actionable data layers	Ecosystem services	Hazard map; wetland contributions to fisheries; water services
	Socio-economic data	Distribution of indigenous peoples; population density
	Habitat and habitat intactness	Habitat – coral reefs, mangroves, sea grass beds; phytogeography; vegetation map;
	Hydrology, water quality	Hydrological map; watershed map
	Invasive alien species	Invasive alien species distribution map
	Key biodiversity areas	Biodiversity hotspots; endemism, important bird areas, important plant areas, species richness
	Land cover/land cover change	Biogeographic data; forest cover change; land cover; wetland maps
	Land use/land use change	Land use – forest and agriculture; land use change
	Policy and management	Forest management units; conservation units
	Corridors, buffers	Biological corridors, buffer zones
	Protected areas	Protected areas (individual); protected area network; Ramsar sites; World Heritage sites
	Regions, zones	Ecological zones, ecoregion, ecosystem map, forest ecoregions, landscape map, natural zones, ocean ecoregion, terrestrial ecoregion, biosphere reserve
	Resource use intensity	Cattle distribution maps, coffee productivity, potential agricultural productivity
Actionable data layers	Climate change vulnerability	Disaster risk areas; sea-level rise
	Protected areas and biodiversity	Protected areas and key biodiversity areas; protected areas and ecoregions; biodiversity and proposed new protected areas
	Proposed buffer zones	Proposed buffer zones
	Proposed new protected areas	Proposed protected areas
	Future footprint	Mining concessions; timber concessions

We determined whether each data layer was actionable based on a set of key questions related to both the Aichi Biodiversity Targets and associated SDGs and their targets, where geospatial data would be critical in implementing strategies and actions (Table 2).

Table 2: Key questions of the Aichi Biodiversity Targets for which geospatial data are critical for taking action

Key questions related to the Aichi Biodiversity Targets for which geospatial data are critical, and their relationship to the Sustainable Development Goals and Targets
• Where are the most important opportunities for managing biodiversity to reduce poverty? (Aichi Biodiversity Target 2; SDG 1.1; 1.2; 1.5)
• Where is natural resource management likely to exceed safe ecological limits and where are the areas most important to implement sustainable management? (Aichi Biodiversity Target 4; SDG 6.4, 15.1, 15.2)
• Where are the highest rates of loss of natural habitats occurring, including forest ecosystems, and where are the best opportunities for halving degradation and fragmentation? (Aichi Biodiversity Target 5, SDG 15.1, 15.2; 15.5)

• Where are the most important opportunities for promoting sustainable management of agriculture, forestry and aquaculture? (Aichi Biodiversity Target 7; SDG 15.2, 15.3)
• Where are the important point sources for pollution, including nutrients, and what are the most important challenges and opportunities for minimizing the impacts of pollution? (Aichi Biodiversity Target 8; SDG 3.9; 6.3; 14.1)
• Where are the pathways for invasive alien species, and where can management interventions have the biggest impact in controlling, eradicating and preventing invasive species? (Aichi Biodiversity Target 9; SDG 15.8)
• Where are the areas of coral reefs and other ecosystems that are most vulnerable to climate change or ocean acidification, and where are the opportunities for maintaining integrity and functioning through protection, restoration and sustainable use? (Aichi Biodiversity Target 10; SDG 14.3)
• Where are most important opportunities to create new protected areas and improve existing ones in order to enhance representativeness, connectivity and effectiveness? (Aichi Biodiversity Target 11; SDG 14.5, 15.1, 15.4, 15.7, 15.9)
• Where are the most important opportunities to protect, restore and sustainably manage ecosystems in order to decrease the decline of species populations and to avoid extinctions? (Aichi Biodiversity Target 12, SDG 14.2, 14.5, 15.1, 15.4, 15.5)
• Where are the most important opportunities to protect and restore ecosystems in order to sustain essential ecosystem services, including water, health, livelihoods and well-being, especially for women, indigenous and local communities, and the poor and vulnerable? (Aichi Biodiversity Target 14; SDG 1.1; 1.2; 1.5; 2.1; 2.4; 6.1; 6.5; 6.6;)

Results

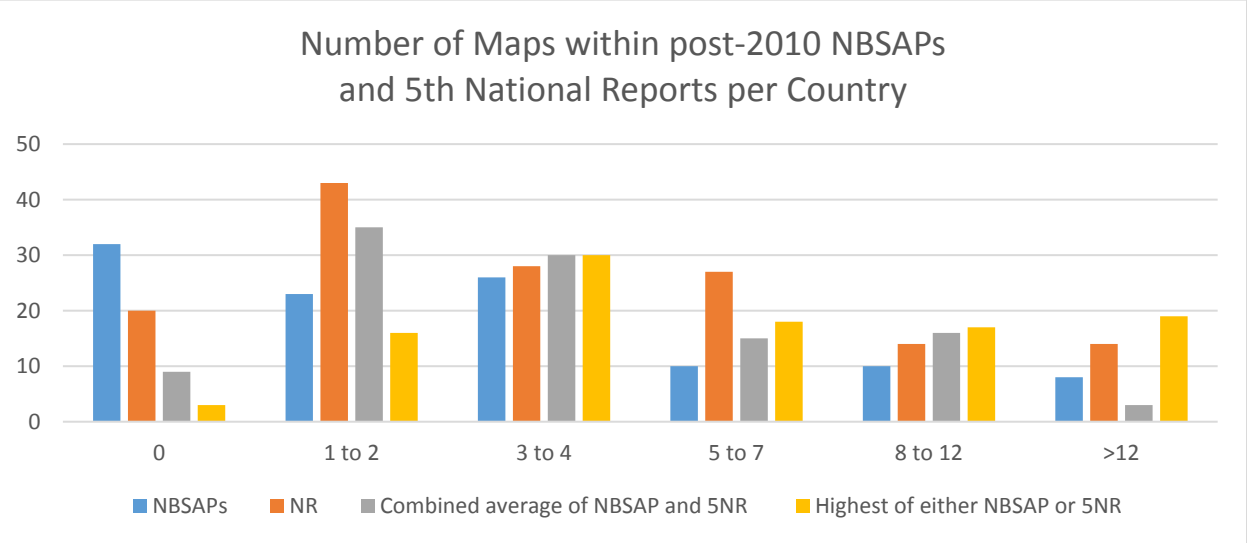
Total number of maps in NBSAPs and 5th National Report, by country

In this analysis, we analyzed a) total number of maps from 109 post-2010 NBSAPs from ODA-eligible countries, per country; b) total number of maps from 145 5th National Reports from ODA-eligible countries, per country; c) combined average (total maps from both NBSAP and 5th National Report, divided by two, for 105 ODA-eligible countries that have submitted both a post-2010 NBSAP and a 5th National Report; and d) the highest number of maps from either the NBSAP or the 5th National Report from 105 ODA-eligible countries that have submitted both a post-2010 NBSAP and a 5th National Report. We included a combined average because some countries had many maps in both reports, and we included the highest number from both reports per country to show overall inclusion of maps within either report. For example, Cuba included 22 maps for their 5th National Report, and no maps in their NBSAP, while The Gambia, included 24 maps in their NBSAP, and 2 in their 5th National Report.

Main findings:

- The average number of maps per NBSAP per country was under 4, excluding just 4 countries with 20 or more maps brings the average down to just over 3 maps per NBSAP
- The average number of maps in the 5th National Report per country was 5; excluding just 6 countries with 20 or maps brings the average to just over 4 maps per 5th National Report
- 32 NBSAPs (29%), and 20 5th National Reports (14%) had no maps at all, and 78 NBSAPs (72%) and 90 5th National Reports (62%) had 4 or fewer maps
- 65 countries (62%) have 7 or fewer maps in either their NBSAP or the 5th National Report, and 45 (43%) of countries have 4 or fewer maps in either report
- 87 countries (83%) have a combined average of 7 maps or fewer between both reports, and 73 countries (70%) have a combined average of 4 maps or fewer between both reports

Figure 1: Total number of maps from post-2010 NBSAPs and 5th National Reports per Country



Types and categories of maps in NBSAPs and 5th National Report, by country

In this analysis, we analyzed the types and categories of all of the maps included in both NBSAPs and 5th National Reports. We looked at the total number of countries with either no maps or no actionable maps; with only non-actionable maps; and with at least one actionable map, in either their NBSAP or their 5th National Report. We also looked at the distribution of each type and category of map for both NBSAPs and 5th National Reports.

Main findings:

- 15% of maps in NBSAPs and 10% of maps in 5th National Reports contain non-actionable data layers (basic features or variables, maps of the country)
- 33% of 5th National Reports, and 20% of NBSAPs, had either no maps, or only non-actionable maps
- 80% of 5th National Reports, and 70% of NBSAPs contained no actionable maps, but did contain potentially actionable maps
- The most frequent maps included in the NBSAP were protected area maps (nearly20% of all maps), basic variables or features (about 10%), and some aspect of key biodiversity (about 10%). The most frequent maps included in 5th National Reports were habitat and habitat intactness (about 16%), key biodiversity areas (about 15%), and protected areas (about 13%).
- Only a small percentage of maps focused on actions for the future – 3% of maps in NBSAPs included proposed new protected areas, and about 2% included a map on the intersection of protected areas and biodiversity.
- Data on resource use intensity are scarce – only 2-3% of the maps focused on this area, and only 1% of NBSAP and 5th National Report maps included data on socio-economic issues.
- Fewer than 4% of maps from either NBSAPs or 5th National Reports focused on ecosystem services

Figure 2: Percent of non-actionable, potentially actionable and actionable data layers in NBSAPs and 5th National Reports

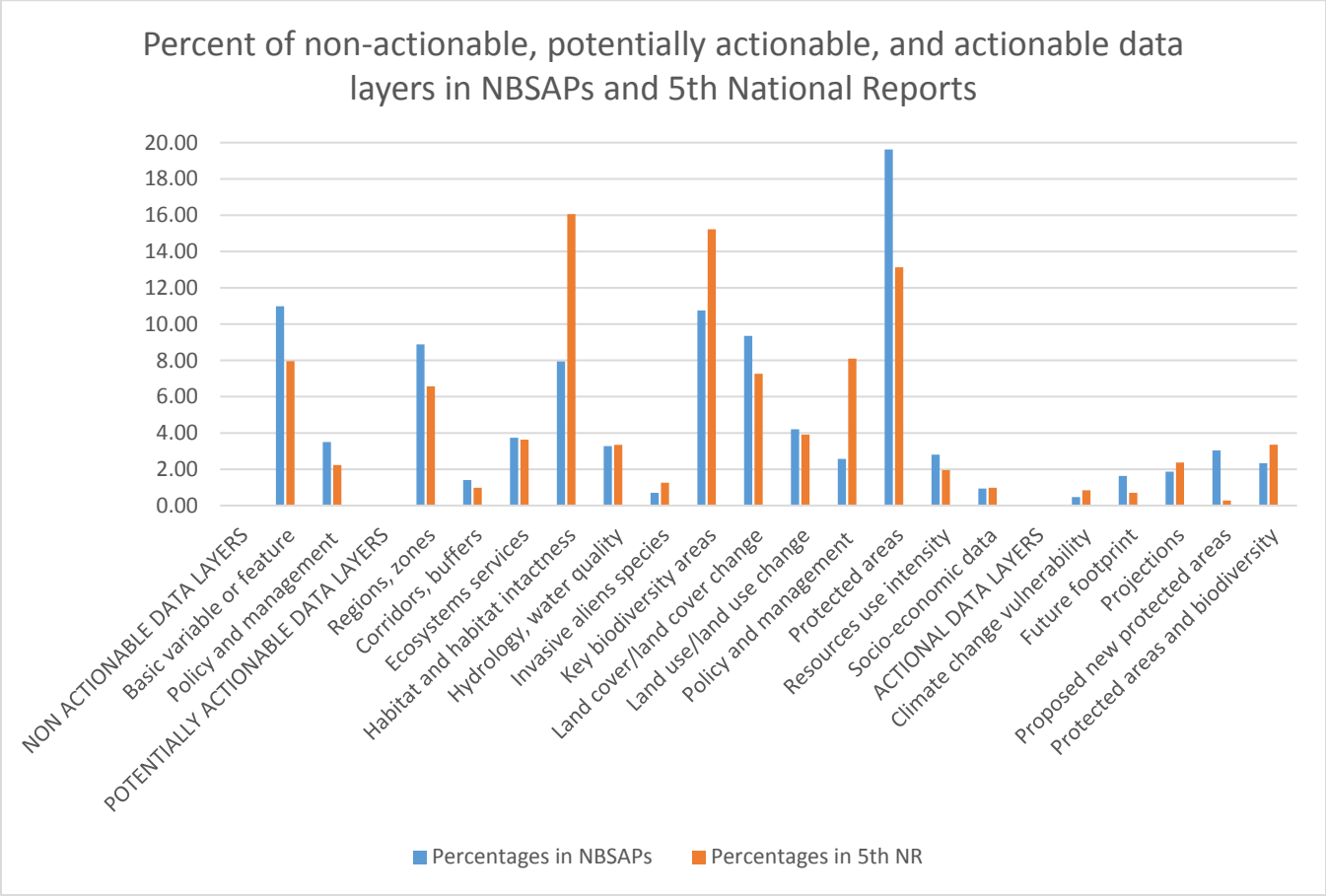
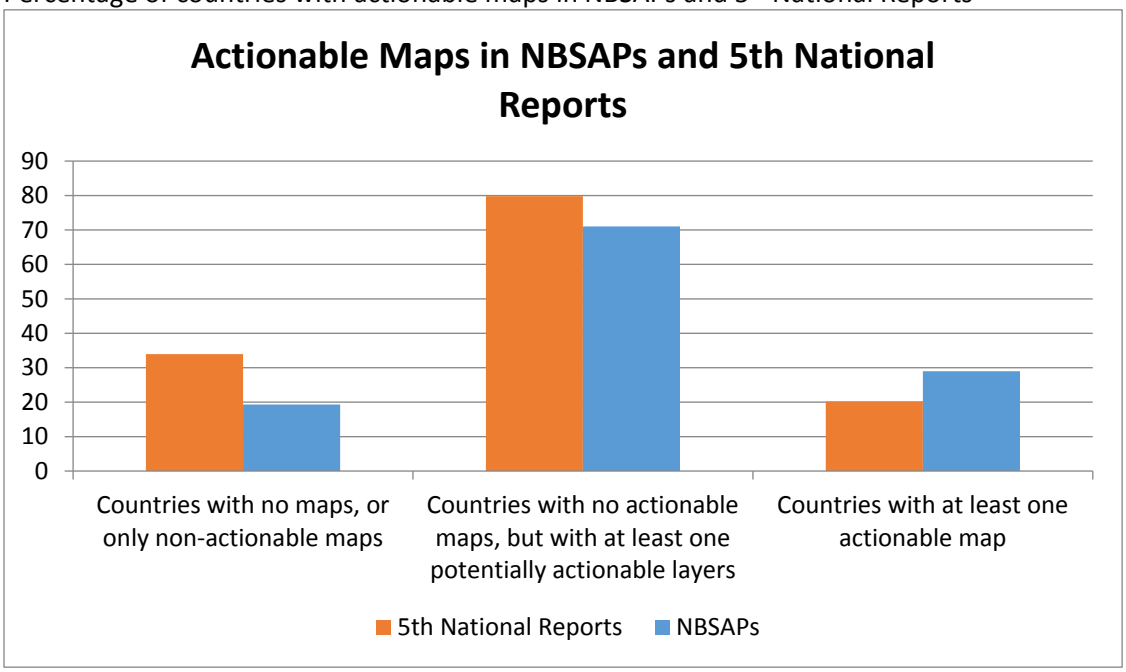


Figure 3: Percentage of countries with actionable maps in NBSAPs and 5th National Reports



Conclusions

From this analysis, we conclude the following:

- The data revolution, and spatial thinking, has not yet permeated NBSAPs or 5th National Reports to the level one might expect;
- Inclusion of spatial data is highly variable across countries, with many countries on the one hand having no maps at all, or only national boundaries, while some countries had an abundance of high-quality actionable maps;
- Most of the actions within NBSAPs, and most of the data within the 5th National Reports, are not spatialized;
- A high percentage of maps from both NBSAPs and 5th National Reports could be used to take action, but only a very small percentage include enough information for decision makers to take action in a spatially-explicit manner; and
- The data included are not sufficient to answer the essential questions of either the Aichi Biodiversity Targets, or the targets within the Sustainable Development Goals, especially related to key socio-economic data (poverty, livelihoods, ecotourism, indigenous land rights), climate change vulnerability, overlay of protected areas with other key information (e.g., key biodiversity areas, essential ecosystem services), extent of degradation and restoration potential, intensity of resource use, pollution, and essential ecosystems services (e.g., water security, food security such as crop wild relatives or pollinators, disaster risk reduction such as coastal vulnerability).

Recommendations

The NBSAPs are intended to contain concrete strategies and actions that countries can take to implement the Convention on Biological Diversity at a national level. However, if we are to manage biodiversity and ecosystems to fully address the Aichi Biodiversity Targets and to deliver on multiple targets across the Sustainable Development Goals, we will need to include additional data sets into national plans and reports, and these data layers must enable policy makers to make better decisions and to take action.

The good news is that the number of data layers required to implement the Aichi Biodiversity Targets on the ground, and thereby accelerate many related SDGs, already exist within a number of countries, or can easily be developed from global data sets. A short list of recommended essential data layers includes:

Basic socio-demographic data layers

- ***Population, poverty and land rights*** (distribution of population densities; types of population groups, including indigenous peoples and local communities; and distribution of poverty levels)

Land cover, bio-geographic data

- ***Land cover/land cover change*** (vegetation maps, forest cover)
- ***Habitat and habitat intactness*** – distribution and degree of intactness and degradation of forests; wetlands; grasslands; drylands; coastal habitats (seagrass beds, coral reefs, dunes, mangroves)
- ***Ecoregion***
- ***Natural resource productivity*** (e.g., soil productivity, water availability, fisheries productivity)
- ***Hydrology, water quality and volume*** (distribution of water quality and volume/availability)
- ***Invasive alien species*** (distribution of density, change over time, key pathways)
- ***Climate vulnerability*** (distribution and intensity of vulnerability of ecosystems, species to climate)

Land, resource use and human footprint

- **Human footprint layer** (aggregate layer of human impact, habitat conversion, roads, infrastructure)
- **Land use/land use change**
- **Future footprint** (concessions map of mining, forestry, oil exploration; planned road networks, infrastructure, energy and mineral deposits)
- **Natural resource management intensity** (e.g., cattle density per hectare, agricultural intensity)
- **Sustainable management** (includes agriculture, e.g., map of certified sustainable agriculture operations; forestry, e.g., map of certified sustainable forestry operations; aquaculture, e.g., map of certified sustainable aquaculture operations)
- **Pollution point sources** (e.g., landfills, discharge pipes, sewage treatment plants, large farming operations, tanneries, refineries, etc.)
- **Water use and demand** (distribution of groundwater withdrawal, municipal water use, agricultural water use, industrial water use)
- **Land tenure and rights** (distribution of land tenure, land use rights, including disputes)

However, these data layers are not enough for policy makers to take action; they must be combined in ways that provide new, actionable information. Table 3 shows how combining multiple sets of data can provide such information on each of the key questions identified in Table 2.

Table 3: Data layers required to provide actionable information on key questions related to implementation of Aichi Biodiversity Targets for which geospatial data are critical

Key questions related to the Aichi Biodiversity Targets for which geospatial data are critical, and their relationship to the Sustainable Development Goals and Targets	**Data layers required to answer key questions and provide actionable information to planners**
• Where are the most important opportunities for managing biodiversity to reduce poverty? (Aichi Biodiversity Target 2; SDG 1.1; 1.2; 1.5)	• Overlay of population, poverty and land rights including indigenous peoples; land cover/land cover change; habitat intactness; protected areas; and ecosystem services - livelihoods
• Where is natural resource management likely to exceed safe ecological limits and where are the areas most important to implement sustainable management? (Aichi Biodiversity Target 4; SDG 6.4, 15.1, 15.2)	• Overlay of land use and land use change; ecosystem distribution and intactness; resource productivity and availability; natural resource management intensity; protected areas
• Where are the highest rates of loss of natural habitats occurring, including forest ecosystems and where are the best opportunities for halving degradation and fragmentation? (Aichi Biodiversity Target 5, SDG 15.1, 15.2; 15.5)	• Overlay of land cover/land cover change (especially for forests); habitat intactness and degradation; human footprint; future footprint; protected areas
• Where are the most important opportunities for promoting sustainable management of agriculture, forestry and aquaculture? (Aichi Biodiversity Target 7; SDG 15.2, 15.3)	• Overlay of sustainable management maps for agriculture, aquaculture and forestry operations; land use; land cover; habitat intactness; key biodiversity areas
• Where are the important point sources for pollution, including nutrients, and what are the most important opportunities for minimizing the impacts of pollution? (Aichi Biodiversity Target 8; SDG 3.9; 6.3; 14.1)	• Overlay of pollution point sources; water quality and volume; water use; population maps; population and poverty; ecosystem services – water
• Where are the pathways for invasive alien species, and where can management interventions have the biggest impact in controlling, eradicating and preventing invasive species? (Aichi Biodiversity Target 9; SDG 15.8)	• Overlay of invasive alien species; transportation; habitat intactness; human footprint; future footprint
• Where are the areas of coral reefs and other vulnerable ecosystems that are most vulnerable to climate change or ocean acidification, and where are the opportunities	• Overlay of protected areas; human footprint; habitat intactness – coastal habitats; climate vulnerability

for maintaining integrity and functioning through protection, restoration and sustainable use? (Aichi Biodiversity Target 10; SDG 14.3)	
• Where are most important opportunities to create new protected areas and improve existing ones in order to improve representativeness, connectivity and management effectiveness? (Aichi Biodiversity Target 11; SDG 14.5, 15.1, 15.4, 15.7, 15.9)	• Overlay of protected areas; habitat intactness, human footprint; key biodiversity areas; future footprint
• Where are the most important opportunities to protect, restore and sustainably manage ecosystems in order to decrease the decline of species populations and to avoid extinctions? (Aichi Biodiversity Target 12, SDG 14.2; 14.5; 15.1; 15.4; 15.7; 15.9)	• Overlay of key biodiversity areas; human footprint; future footprint; protected areas; habitat intactness
• Where are the most important opportunities to protect and restore ecosystems in order to sustain essential ecosystem services, including water, health, livelihoods and well-being, especially for women, indigenous and local communities, and the poor and vulnerable? (Aichi Biodiversity Target 14; SDG 1.1; 1.2; 1.5; 2.1; 2.4; 6.1; 6.5; 6.6)	• Overlay of protected areas; key biodiversity areas; human footprint; habitat intactness; population and poverty; and essential ecosystem services data layers

There are about 1360 days left to go to reach the Aichi Biodiversity Targets, and there are 13 and a half years left to achieve the Sustainable Development Goals. As countries move into the implementation phase of their NBSAPs, and as they move into the next round of the 6th National Reports, there is still time to account for new data sets in these reports that will allow planners to take the steps required now in order to manage biodiversity and ecosystems to deliver the ecosystem services that will become even more essential in the future.

Citation:
Ervin, J., de Silva, A., Hart, T., Shrestha, D., Supples, C. and Ahmed, H.. 2017. *Are We Counting on Nature? An Analysis of Spatial Data included in Post-2010 National Biodiversity Strategies and Action Plans and 5th National Reports*. Unpublished discussion paper. UNDP.