



ORINOCO RIVER BASIN

2016
REPORT CARD
COLOMBIA



The Orinoco River: water, biodiversity, & challenges

The mighty Orinoco River, one of the longest rivers in South America (2,150 km), is ranked third worldwide in flow and fifth in sediment transport. The basin, which covers 981,446 km² and is shared by Colombia (35%) and Venezuela (65%), is one of the most biologically, hydrologically, and culturally rich areas in the world. Water and nutrients that originate in the upstream ecosystems of the Andes and the Guyana Shield maintain and regulate hydrological functions and ecological processes downstream in the Llanos floodplains. In the Llanos, the flow of sediments and water slows and along with seasonal rains, replenishes rivers and wetlands that serve as important habitats. Diverse species such as birds, mammals (jaguar, river dolphins, and otters), reptiles (the endangered Orinoco crocodile), and fish rely on these habitats as well as the important tropical forest area of the Amazon–Orinoco transition zone.

Abundant water in the Orinoco River Basin supports the needs of people, agriculture, energy and industry (oil and gas) that are vital for Colombia's social and economic development. But the basin faces increasing pressures from the expansion of mining (942 concessions for 2014), oil and gas (8 million ha under exploration), agro-industry (320,829 ha), and infrastructure, which if not adequately planned and implemented can disrupt the hydrology and ecosystem services of the region. Additionally, the Orinoco Basin's seasonal rainfall patterns will potentially face further extremes and unpredictability from climate change, leading to greater droughts, flooding, and fires. Maintaining the health of the Orinoco River Basin is vital to support adequate water and services critical for people, the economy, and nature.



Map of the Orinoco River basin, highlighting the Colombian portion that is included in this report.



Basin report cards

River basin report cards have been shown to be a powerful instrument to describe ecosystem status, increase public awareness, and inform and influence decision-makers to take action to improve or maintain the health of a river basin. The process of developing report cards is highly participatory and includes the following five steps: identification of values and threats, selection of indicators, definition of thresholds, calculation of scores, and communication of results. The Colombian Orinoco River Basin Report Card, developed with several national Colombian organizations, is the first of its kind carried out through the Basin Report Card Initiative, a partnership between World Wildlife Fund (WWF) and the University of Maryland Center for Environmental Science (UMCES). This partnership aims to expand report card use worldwide, as a mechanism to improve river basin awareness and management. Report cards can also serve as a mechanism for providing data and tracking indicators associated with the Sustainable Development Goals (SDGs), within the 2030 Agenda framework. The link between the report card and the SDG indicators will support and complement Colombia's implementation of the SDGs.



Orinoco's first report card

Through stakeholder engagement, eleven indicators were shortlisted to measure the health of the Orinoco Basin. The status of these indicators was evaluated by comparing data to scientifically-derived thresholds or goals. The report card includes multiple indicators and combines them into a score for each of the sub-basins in addition to an overall score for the Orinoco River Basin in Colombia.

Most of the indicators are derived from official information sources such as the Colombian Environmental Information System. However, significant limitations remain to be able to assess all of the indicators identified through stakeholder engagement. Further research and development over the next few years will improve the rigor and value of the report card by including additional key biodiversity indicators and impacts from oil and gas (consistently raised as topic of interest and concern during all workshops) and agro-industry development.



The first Orinoco River Basin report card provides a transparent evaluation and a snapshot of the health of the basin in a concise, easy-to-understand format to begin a dialogue about the future of the basin. The report card has improved understanding of the river, but is only the first step. This report card can provide a basis of information to influence policy and planning in the region (e.g. National Water Resources Policy and the Orinoco Macrobasin Strategic Plan).



Several workshops were held throughout the Orinoco to develop the report card.



In addition to this report card, there are ten sub-basin report cards that provide further details for specific sub-basins.



Developing the Orinoco River Basin report card

Stakeholders throughout the Colombian portion of the Orinoco River Basin (149 representatives from 71 organizations) identified the most important values for the basin and determined key threats to these values during workshops for the sub-basins of the Meta, Bitu, Guaviare, Arauca, Tomo, Tuparro, and Vichada between June 2015 and April 2016. The values and threats were grouped into the following categories: Biodiversity, Management & Governance, Ecosystems & Landscapes, Economy, People & Culture, and Water. Given that human health is a critical part of societal health within basins, indicators of human well-being were

critical to include in the basin report card. For each category, several indicators were determined that could be used to calculate the status of basin health. Unfortunately, data were not available for all proposed indicators. The indicators with sufficient data were water quality, risks to water quality, water supply and demand, natural land cover, stable forest area, terrestrial connectivity, fire frequency, human nutrition, mining pressure in sensitive ecosystems, and river dolphins. These indicators form the basis of the Colombian Orinoco River Basin Health Report Card.



Key indicators of basin health



Water Quality Index

The water quality index assesses the status of water quality variables (dissolved oxygen, total suspended solids, chemical oxygen demand, electrical conductivity, and pH) based on data from the Environmental Information System Indicators (IDEAM).



Risks to Water Quality

The risks to water quality index estimates pressure to water quality due to pollution loads discharged by industry and water use by domestic, livestock, and coffee processing sectors (IDEAM).



Water Supply and Demand

The water supply and demand index is the balance between the availability of water in the watershed, environmental flow requirements, and the water demand by different economic sectors (IDEAM).



Natural Land Cover

The natural land cover indicator measures landscape conversion by comparing the area of natural to non-natural (developed) in the basin, based on satellite imagery for 2012. Loss of natural land cover impacts biodiversity in the basin (PEMO).



Stable Forest Area

This indicator measures the amount of forest that has remained stable in the Amazonian transition sub-basins for the period 1990–2014, where forests are the main or dominant ecosystem. Forest area was calculated using satellite imagery (IDEAM 2015, Forest monitoring system).



Terrestrial Connectivity

Wildlife depends on connectivity between different ecosystems and habitats. The Landscape Shape Index (from University of Massachusetts, Amherst) was used as a measure of fragmentation of terrestrial habitats within each basin.



Fire Frequency

Fire has been shaping parts of the savanna ecosystems for thousands of years. The fire indicator examines the average frequency of fires over the last three years (2013-2015) in each sub-basin compared to historical fire trends.



Ecosystem Services

The Ecosystem Services Regulation Indicator is based on the average of Climate Regulation by Carbon Storage, (PEMO 2013), Hydrologic Regulation Index that measures the amount of moisture that can be retained in basins (IDEAM 2015), and the Soil Erosion Susceptibility Zoning that shows the different erosion rates based on land assessment methods (IDEAM 2015).



Human Nutrition

The human nutrition indicator assesses the percentage of children aged 0-4 with a healthy body weight. This indicator is a proxy for the capacity to provide enough food for people in the basin. Information on human weight was available from the National "Survey of the Nutritional Status in Colombia" conducted in 2010.



Mining in Sensitive Ecosystems

This indicator examines the presence of mining concessions within sensitive ecosystems including: páramos, montane forest, riparian forest, wetlands, and flooded savannas.



River Dolphins

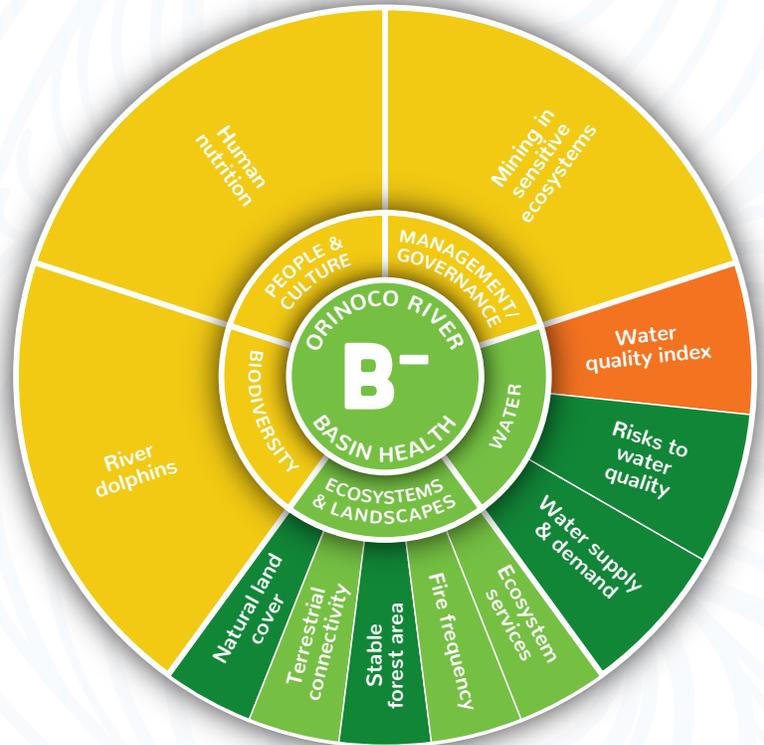
River dolphins are listed as a vulnerable species in Colombia and are an important indicator species of river health where they are present. Data from the Omacha Foundation includes estimates of abundance and habitat use patterns in the Meta, Orinoco, Bitá, Arauca, Guaviare, and Inírida rivers.

Colombian Orinoco River

Moderately good health, but action needed now

Overall the Orinoco River basin received a B- (63%). Results varied widely, with generally better results for indicators within Ecosystems & Landscapes and Water categories, than indicators from the Biodiversity, People & Culture and Management & Governance categories. However, it is important to note that the poorer scoring categories also had the fewest indicators due to limited data availability. Overall basin scores ranged from as low as 39% for Water Quality, to as high as 93% for Stable Forest Area (representing intact forests between 1990-2014 in the Amazon-Orinoco transition zone).

At the sub-basin scale, results showed a strong west-east gradient where the Upper Meta had the poorest grade, D+ (37%), and Matavén had the highest grade, A (87%). The differences between western and eastern portions of the Orinoco River Basin are due to development pressure in the west, resulting in poorer water quality, and significant changes to the landscape.



What do the grades mean?

A 80–100% Excellent

All indicators meet objectives. Indicators in these locations tend to be very good, most often leading to preferred conditions.

B 60–80% Good

Most indicators meet objectives. Indicators in these locations tend to be good, often leading to acceptable conditions.

C 40–60% Moderate

There is a mix of some indicators that meet objectives, and others that do not. Indicators in these locations tend to be fair, leading to sufficient conditions.

D 20–40% Poor

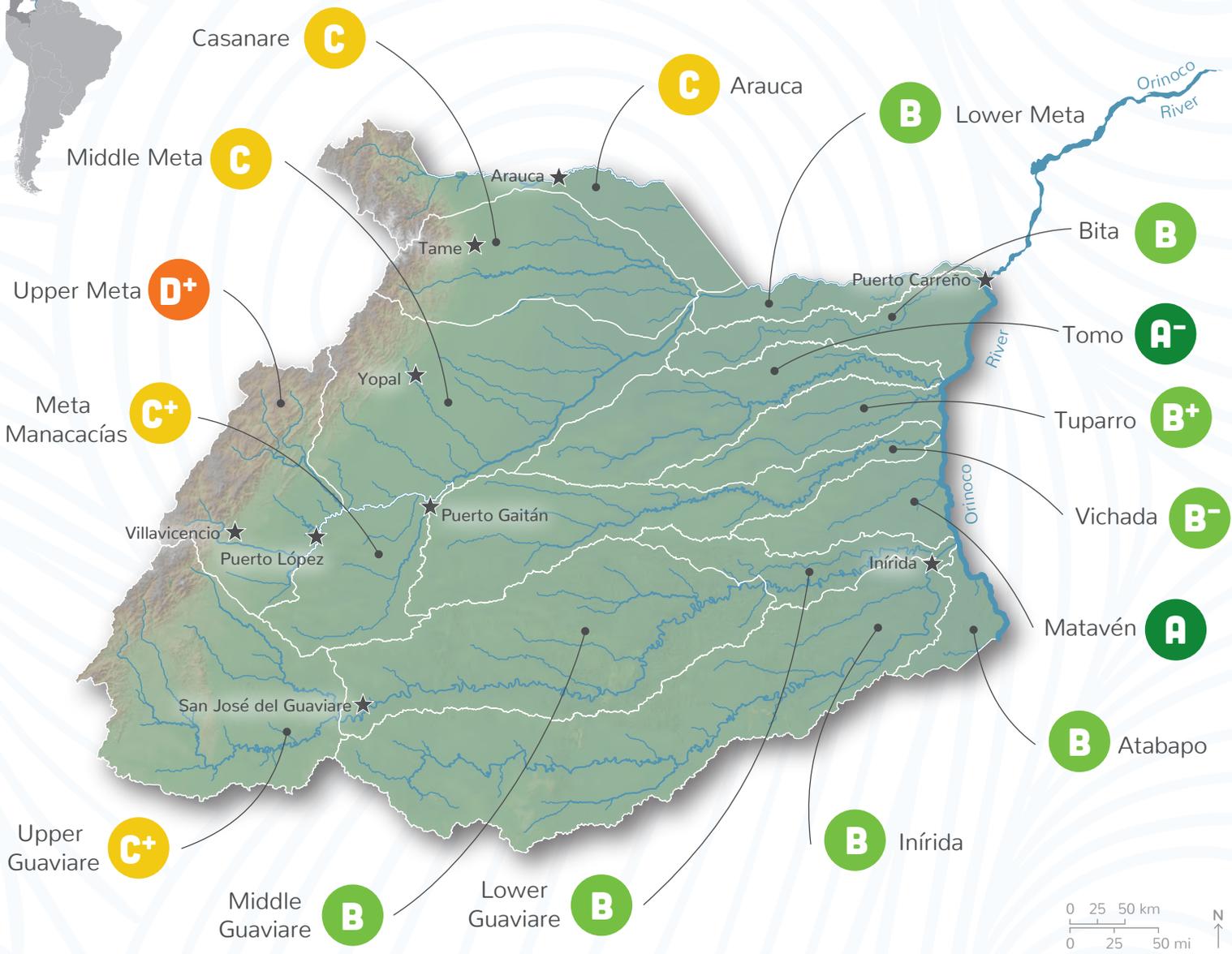
Some or few indicators meet objectives. Indicators in these locations tend to be poor, often leading to degraded conditions.

F 0–20% Failing

Very few or no indicators meet objectives. Indicators in these locations tend to be very poor, most often leading to unacceptable conditions.



Basin 2016 Report Card



Notable changes in Andean sub-basins in the west include elevated rates of deforestation in the Upper Guaviare, associated with poor water quality; a lack of terrestrial connectivity in the Upper Meta; major changes in the fire regime in the Meta Manacacías; low water quality and mining for construction materials in Casanare, as well as below average human nutrition in the Arauca basin. Furthermore, these sub-basins have undergone significant agro-industrial expansion, oil and gas exploitation, urbanization, and intensive livestock activities.

The Llanos and Amazon transition sub-basins to the south and east were not immune to poor scores with the Inírida sub-basin receiving the poorest score (31%) for human nutrition (based on the weight of 0-4 year-old children), and the Vichada scoring poorly (25%) for mining of construction materials for new infrastructure, mainly related to the oil boom in the region.



The report card and its contributions to the Sustainable Development Goals

On September 25, 2015, countries across the world negotiated and adopted an innovative and new global agenda called the 2030 Agenda and Sustainable Development Goals (SDG), that aims to tackle the most urgent issues that are threatening human well-being. This agenda is universal, integrated, and indivisible, and balances the three dimensions of sustainable development. The 17 SDGs and 169 targets are a new opportunity for global and national development for the next fifteen years.

While the report card is an initiative for basin management, the broad nature of the SDGs framework represents an opportunity to identify synergies and articulation between the basin report card and several SDGs. The specific linkages between them were identified by comparing the 17 goals, 169 targets and more than 250 indicators from the SDGs with the 11 final indicators of the basin report card.

The basin report card assesses issues such as human nutrition, which can be directly linked with at least 4 SDGs indicators under Goal 2 that intends to end hunger and improve nutrition while promoting sustainable agriculture. Goal 6 on Water is another key synergy, as the indicators under this goal and the report card indicators both address water access, demand, and quality. Pressure from extractive

and productive sectors is also a common issue to both, as the report card addresses mining pressure in sensitive ecosystems in the Orinoco whereas sustainable production patterns are measured under Goal 12, which addresses the need to rationalize inefficient and harmful subsidies for fossil fuels.

There are also other report card indicators that relate to more than one SDG goal. For example, the land cover change indicator can be linked with Goal 15 on terrestrial ecosystems, that has a specific indicator on the proportion of degraded land, and also to Goal 11 on cities, that has an indicator that tracks the ratio of land consumption relative to population growth. Finally, several report card indicators relate directly to Goal 15 on terrestrial ecosystems, both addressing issues such as ecosystem connectivity, forests, species conservation and ecosystem services.

This exercise indicated not only that the holistic approach of the SDGs can serve as a key framework to address integrated basin management, but also that the basin report card can be a useful tool to build a baseline of data that can contribute in improving national reporting processes towards the achievement of the SDGs and 2030 Agenda.



The Orinoco Basin provides services for people: a home, transportation corridor, and food source. Left photo by Alexandra Fries. Right photo by Meredith Kohut.



A basin in transition

From various perspectives, Colombia faces major challenges and opportunities. Rapid economic growth and a recent peace agreement after more than half a century of conflict, open the door to enormous possibilities and growth potential across the country. The Orinoco River Basin is at the center of this new landscape of opportunity for economic development in the country.

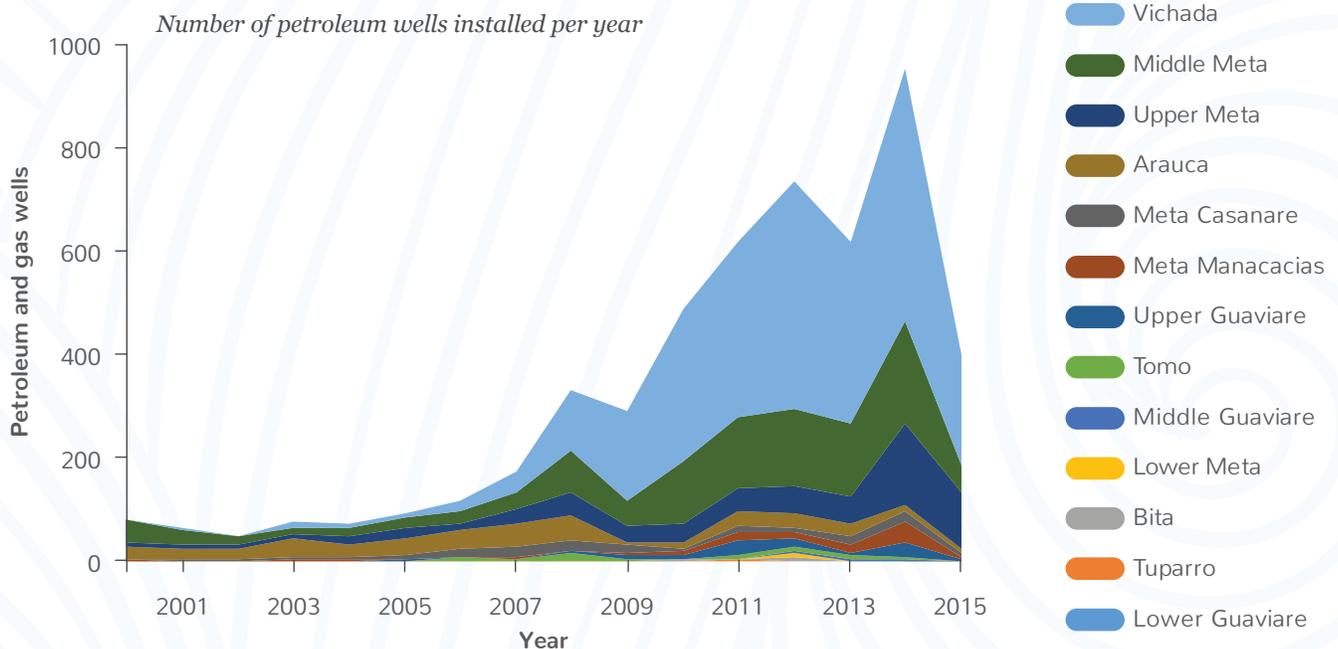
These rapid changes are taking place in the context of the Sustainable Development Goals (SDGs). Colombia is a global leader in the formulation of the SDGs and is in the process of putting in place the institutional mechanisms, public policy, information systems, and data to track progress towards these global goals and to ensure their implementation by 2030. Additionally, Colombia is conducting a voluntary national review to be presented at the High Level Political Forum for Sustainable Development.

From drinking water, to rich fisheries, to the potential for business development, the Orinoco River Basin provides precious resources and is shared by diverse stakeholders. As Colombia develops, these diverse water users are increasingly looking to the Orinoco to support their activities. Unfortunately, some of these activities are beginning to degrade the health of the basin, putting the river and those that depend on its services at risk. Furthermore, decision makers do not have the information needed to determine the impact of such activities, further aggravating the situation.

The lowest scores of the Basin Report Card were noted in the Upper and Middle Meta, Upper Guaviare, Arauca, and Casanare. These low scores correlated with the loss of natural land cover and large-scale transformation of these sub-basins. This is compounded by increased mining and oil and gas development in sensitive ecosystems. Even some of the best scoring sub-basins, such as Inírida and Atabapo, are increasingly affected especially by often-illegal, small-scale mining.

These results emphasize the need for integrated land use planning, where various stakeholders—government, productive sectors, communities and conservations—work together to identify and implement actions that mitigate, compensate, and prevent impacts of development. This approach will ensure that resource use and production are compatible with the maintenance of hydrological dynamics and biodiversity of the basin.

The National Development Plan (2014-2018) and initiatives such as the BioCarbon Fund with the World Bank are opportunities to build a differentiated, low carbon development model that promotes environmental sustainability and ecosystem conservation into the green growth and post agreement/peace building frameworks.



National Hydrocarbon Agency 2016.



Findings and Recommendations

- 1** **Land use change, loss of natural cover and ecosystem transformation are the major threats to the basin**, due mainly to agro-industry, hydrocarbon and livestock expansion and poorly planned infrastructure development. Enhanced regional and sectoral planning of the basin is needed and should aim to maintain connectivity and ecosystem integrity, and provide the quality and quantity of water upon which all productive sectors depend. The Strategic Plans for the Amazon and Orinoco River Basins and the National Policy on Integrated Water Resources Management provide guidelines and information that should be used for integrated planning.
- 2** **Updated and accurate information and comprehensive monitoring are needed** to publicize and manage current and future impacts of resource use in the basin. Three big gaps should be resolved in the short term: a) impact assessments on water resources from hydrocarbon development; b) greater coverage of water quality monitor stations for the Arauca, Atabapo, Matavén, Tomo, Tuparro, and Bitá; and c) biodiversity surveys for the Guaviare, Inírida, Vichada, Matavén, and Arauca rivers basins.
- 3** **Accurate and powerful communication tools and information systems are needed to track, create awareness, and manage the current and future impacts** of land use and productive activities, not only for individual projects, but cumulatively across the basin.
- 4** Ecosystems degradation of savannas and wetlands is another threat in the Orinoco. **Provision of adequate space for nature conservation, through protected area declarations, or efforts to protect rivers, such as that occurring in the Bitá River, is needed** secure a future for biodiversity and water resources, and contribute to climate change resilience.
- 5** Changes in fire regimes in some sub-basins indicate that more intensive land use in combination with climate variability, will increase vulnerability and risks of climate change. **Regional analyses of the suitability of production systems should include impacts on biodiversity, as well as water resources and climate risks.** These approaches will strengthen studies carried out by the Agricultural Rural Planning Unit of the Agriculture Ministry.
- 6** **Economic development can alter natural dynamics—but it doesn't have to.** A number of productive initiatives are underway that aim to promote growth without severely impacting savannas, forest and wetlands. Examples include two Global Environmental Facility projects: Mainstreaming Biodiversity in Oil Palm Zones and Mainstreaming Sustainable Cattle Ranching. Strengthening and promoting these types of initiatives should be a priority.
- 7** **The Orinoco Report Card is framed in the context of the two strategic plans of the Orinoco and Amazon macrobasins** as part of the National Water Management Policy implementation. Support for the creation of Macrobasin Regional Environmental Council (CARMAC) should be a priority. CARMAC is the legal coordination mechanism to increase awareness about the values and threats in the basin and to ensure more effective governance especially over water resources.
- 8** **Local management can contribute to global goals.** The Orinoco River Basin Report Card has many synergies with global initiatives, such as the Sustainable Development Goals (SDGs). The results of the report card can be a valid source of information to measure progress and the Colombian contributions to the SDGs.



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