



## THE IAI SCIENTIFIC AGENDA

Adopted at the

***29th meeting of the Conference of the Parties to the  
Inter-American Institute for Global Change Research  
22-23 June 2021, Virtual Meeting***

### **Background**

The primary objective of the IAI is to encourage scientific research beyond the scope of national programs by advancing comparative and focused studies based on global environmental change (GEC) issues important to the region as a whole. The term GEC refers to the interactions of biological, chemical, physical and social processes that regulate changes in the functioning of the Earth system, including the particular ways in which these changes are influenced by and impact on human activities.

The Agreement establishing the IAI states, “The Institute shall have an evolving Scientific Agenda, reflecting an appropriate balance among biogeographical areas of scientific importance; an integration of scientific, economic and sociological research; and shall focus on such regional issues as the Conference of the Parties shall determine (Article III: Scientific Agenda).”

To meet the goals of the Scientific Agenda, the IAI encourages and supports the joint collaboration of scientists, stakeholders, and decision makers of the Americas to address and communicate critical issues associated with GEC.

### **Foundational Principles**

The IAI pursues scientific excellence, international cooperation and the full and open exchange of scientific information relevant to GEC through the following foundational principles (IAI/COP/27/14 Strategic Plan): transdisciplinary science, participatory and inclusive design, innovative and solution based science, multi-scalar analysis and integration, open data/science, scientific outreach and knowledge mobilization, alignment with environmental governance frameworks, and strengthening capacities across the science-policy interface. When appropriate, these principles should guide the research supported by the IAI.

### **Strategic Areas**

The IAI supports science that improves the Americas’ ability to cope with and thrive under GEC, making a positive impact towards the sustainability of the region in the following strategic areas (IAI/COP/27/14 Strategic Plan, Theme II - Science for the Sustainability of the Americas):

reduction of poverty and inequality; improving food, water, and energy security; climate change adaptation and mitigation; improved human health and wellbeing; conservation and restoration of biodiversity and ecosystems; clean air, water and soil. Research supported by the IAI should align with these strategic areas.

Decision XXVII/12, which established the IAI's Strategic Plan articulates the mechanisms and methods to provide Parties with the science necessary for the development of more effective public policy. While the Scientific Agenda presents a broad and general direction to the scientific programs, the Strategic Plan is a more specific mechanism for its implementation.

### **Research Themes**

The following four broadly defined and interrelated research themes have been identified by the IAI:

- Human dimensions of GEC
- Climate change and climate variability
- Ecosystems, biodiversity, land use and cover, and water resources
- Global change modulations of the atmosphere, oceans and fresh waters

Example topics under each theme are provided in Annex 1. Topics are not intended to be exhaustive, and given the transdisciplinary nature of the science, many topics may fall into more than one theme. In particular, science on human dimensions should cut across all themes, as well as science to support adaptation and mitigation to GEC.

As indicated above, the evolving nature of the Scientific Agenda provides a means for the Parties to continually incorporate new scientific priorities and to address changes based on the needs of the region's countries. The current version of the Science Agenda will continue to be revised as needed during future intersessional periods, particularly when the Strategic Plan is revised (every 3-6 years).

## **Annex 1: Examples of research topics under each theme**

Topics are not intended to be exhaustive, and given the transdisciplinary nature of the science, many topics may fall into more than one theme. In particular, science on human dimensions should cut across all themes, as well as science to support adaptation and mitigation to global environmental change (GEC).

### **1. Human dimensions of GEC**

- Participatory decision making, institutional capacity, co-design of policies, strategic policy and territorial planning instruments, and other governance mechanisms to improve sustainability.
- Governance, empowerment and power, social/citizen organizations, and cultural/societal values and structures from local to global scales – linkages with sustainability, best practices, and effective models.
- Analysis of new pathways for collaboration towards environmental sustainability, including local to global state and non-state actors, public-private partnerships, among others.
- Creation of enabling and suitable environments to support scaling up and mainstreaming of transdisciplinary and sustainability actions.
- Creation/promotion of innovative incentive mechanisms that encourage the adoption of sustainable practices.
- Indigenous and local knowledge and worldview with respect to GEC, wellbeing, equitable intergenerational action, and other cross cutting topics.
- Impacts and interactions of gender with GEC (gender mainstreaming)
- Health and GEC linkages with emphasis on emerging epidemics, climate-sensitive diseases, vector-borne diseases, zoonoses, the consequences of poverty, and strategies to reduce health inequalities.
- Effects of GEC on disaster occurrences and associated vulnerability of human settlements, mitigation strategies, and policies that limit loss of life and property.
- Sustainability of wild and anthropogenic ecosystems under conditions of urbanization.
- Changes in food systems; potential actions for increasing food security and nutrition.
- Implications for conservation and biodiversity strategies under conditions of global economic change and GEC.
- Impact of global change and climate variability on fisheries and fishers; strategies for limiting socio-economic and ecosystem impacts.
- Identification of factors that contribute to resilience of wild and anthropogenic ecosystems; conservation strategies to promote resilience.
- Effects of GEC on water supply, freshwater flows, and the security of water for human uses.
- Effects of GEC on energy security.
- Analyses of regional and international legal and policy mechanisms and frameworks to support sustainable development and the reduction of poverty and inequality.
- Economic analyses such as assessments of GEC impacts; adaptation and mitigation strategies; valuation of ecosystems services; structuring of international funding to support sustainable development; 'blue growth' and 'green growth' and associated economic opportunities.

## **2. Climate change and climate variability**

- Tropical Atlantic Variability (TAV), Madden-Julian Oscillations (MJO) El Niño-Southern Oscillation (ENSO) and other forms of low-frequency climate variability, such as decadal variations (Atlantic Multidecadal Oscillation (AMO), Pacific Decadal Oscillation (PDO) and their teleconnections to key processes and impacts in the Americas (e.g., tropical cyclones, monsoons, droughts, heat waves and other extreme events).
- Climate variability across temporal scales and their primary modes of variability (such as annual) to improve weather and climate predictions and to reduce the uncertainties related to climate change projections and their impacts. Note that uncertainties may arise from internal model variability, errors in observations and models, and future socio-economic scenarios.
- Short- and long-term ocean variability, including abrupt climate change, and its influence on climate and weather of the surrounding continents.
- Variability of the American Monsoon systems.
- Ocean/land/atmosphere interactions and hydrology, including atmospheric mesoscale processes.
- Extreme climate and weather events (heat waves, tropical storms, drought), including studies of mechanisms and predictability of large-scale convective systems.
- Climate change and variability at regional scales: drivers, methodologies regarding regional climate change and variability (dynamical and statistical models), future scenarios, impacts, vulnerability, and risks.
- Detection and attribution of climate change in meteorological events and climate extremes. Impacts of extreme events on strategic areas and sectors.
- Past climate change.
- Development of the Americas component for Global Climate Observing System.
- Causes of societal vulnerability to climate change/variability and actions to reduce vulnerability in the region.

## **3. Ecosystems, biodiversity, land use and cover, and water resources**

- Impacts of GEC on biodiversity, ecosystem services and ecosystem function, including species and genetic biodiversity of wild and anthropogenic ecosystems (e.g., agriculture, aquaculture, livestock, silviculture, urban areas).
- Comparative studies of resilience of wild and anthropogenic ecosystems, key species, ecosystem services, and ecosystem function.
- Comparative studies of changes in land use, soils, and/or coastal/marine/freshwater resource use.
- Prediction and documentation of estuarine changes due to changes in freshwater inflows as well as changes in watershed land use and cover.
- Changes in climate, land use/ land cover, soils and habitat and their impacts on species, ecosystem services, and ecosystem function across the Americas.
- Impacts of sea water acidification and desalinization in marine biodiversity, ecosystem services and function.
- Observation and monitoring for the sustainable management of biodiversity, forests, and soils (territorial management), baseline assessments of land degradation indicators.
- Land management practices: interactions with ecosystem services and ecosystem function to sustain livelihoods.

- Participatory assessment of sustainable land management practices that avoid and reduce land/soil degradation and restore ecosystems, reduce emissions and improve the provision of ecosystem services and function (territorial management).
- Scenarios and modeling in biodiversity, ecosystem services and function, and human well-being using the nature's future framework.
- Interlinkages among biodiversity, water, food, and health in the context of climate change.
- Underlying causes of biodiversity loss, determinants of transformative change and options for achieving the 2050 vision for biodiversity.
- The role of Indigenous and local knowledge to sustain nature's benefits to people.

#### **4. GEC modulations of the atmosphere, oceans and fresh waters**

- Effects of air pollution and rain water quality on wild and anthropogenic ecosystems.
- Aerosol impact on climate change and variability.
- Impact of mega-cities on regional climate.
- Regional and global air pollution: transport and impacts.
- High latitude processes and ozone depletion.
- Comparative studies of regional air and water pollution.
- Studies focused on understanding and optimizing the integrated nature of air quality and climate mitigation strategies, including short-lived climate pollutants.
- Biogeochemical processes (including the carbon cycle) and ecosystem hydrology.
- Greenhouse gases, atmospheric and terrestrial processes, including the carbon cycle, and their impact on climate change.
- Coastal processes and water pollution.
- Global and regional changes in the water cycle, particularly watersheds of importance in the Americas.
- Spatiotemporal distribution of pollution over wild and anthropogenic landscapes, with implications for ecosystem health, human health, and inequalities.
- Integrated coastal and marine ecosystems facing GECs and impacts on local communities and ecosystem services and function.
- Adaptation measurements of the productive economic sectors of coastal and marine systems facing GECs.
- Coastal and marine governance and decision-making under scenarios of extreme and abrupt changes.