



Biennial Report 2007 - 2009

Mission

The mission of IAI is to develop the capacity of understanding the integrated impact of past, present and future global change on regional and continental environments in the Americas and to promote collaborative, well informed actions at all levels.

Core values

IAI pursues the principles of scientific excellence, international cooperation and full and open exchange of scientific information relevant to global environmental change.

Vision

The IAI was envisaged as an intergovernmental instrument by which scientists and decision makers of countries throughout the Americas might jointly address the critical issues associated with global change in the region.

Inter-American Institute for Global Change Research

Biennial Report 2007 - 2009

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Form top to bottom: 1. Flooded Buenos Aires (courtesy Jorge Codignotto), 2. CRN 2017 – measuring mobile emissions, 3. SGP-HD 009 – Gaucho region, Uruguay, 4. Fire in Cordoba, Argentina (courtesy Pat Young), 5. SGP – HD 004 - Irrigated Parcels, Palca, Peru, 6. CRN 2047 – Icebergs from Glaciar Upsala, South Patagonian Icefield, 7. CRN 2050 - Boston College students installing a micro-weather station at the home of a local resident in Yotohlin, Mexico, for monitoring weather and environmental conditions near a cave where stalagmites have been sampled for paleotempestology study (Photo credit: A. Frappier), 8. CRN 2076 - Benthos

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Foreword

It is a pleasure to present this report at a time when the IAI's science networks are interlinking to provide new, exciting insight into global change phenomena, their impacts on ecosystems and societies, and into options for adaptation. Synthesizing science and knowledge across the 21 networks and projects has just begun and is already promising to move understanding of global change well beyond the goals and expectations of the individual projects. At the same time, the IAI is engaging in a dialogue with UNFCCC and Global Programs, linking the regional science to global efforts. The IAI's training institutes are also developing beyond "training" objectives. They bring together young scientists with practitioners, government and NGO participants to develop a broader vision of global change science, its applications and responsibilities. These new achievements and large number of recognitions given to scientists in the IAI's programs are a sign that the institute is having success in its mission to enable the continent to bring the best possible science to bear on understanding, mitigating and adapting to global change. ▣

Holm Tiessen
Director

The science

For 17 years now, the IAI is funding high-quality global change research throughout the American continent. The challenges of continent-wide research and capacity-building have been met by many successes. In 2007, the American Association for the Advancement of Science (AAAS) published its external review of the IAI:

"There is little doubt that the IAI is as important today as it was when the governments of the Americas first created it. As we look toward the future need to take further steps to promote sustainable development and well-being in the hemisphere, the IAI will take on even a more important role in informing government action." (Vaughan Turekian, AAAS's chief international officer) .

"I'm pretty optimistic and I think we're going to see support for IAI growing in the next decade or so, especially if it is successful in communicating why the information it generates is useful to policymakers. I think the health of the organization depends on that communication, and the capacity of societies to respond to global change will be enhanced by that communication" (Jerry Melillo, co-director of The Ecosystems Center at the Woods Hole Marine Biological Laboratory).

Clearly, the IAI and therefore the scientists funded by its programs can build upon impressive science achievements but must not lose sight of the purpose of their science: to provide knowledge to inform action on the adaptation to and mitigation of global environmental change.

The IAI's science programs , to a large extent funded with grants from the United States National Science Foundation (NSF), have generated scientific output which over the past four years has been incorporated into policy briefs, extension publications and decision support systems. With the help of the Canadian International Development Research Centre (IDRC), 29 scientists from several IAI projects combined their efforts in a program on landuse change, biofuels and rural development in the La Plata Basin. In this program, scientists have become engaged with government agencies, communities and producer organizations, comparing farmers perceptions with their natural science results, and integrating knowledge to develop management options that provide for a future under landuse and climate change.

With a grant from the John D. and Catherine T. Mac Arthur Foundation, the IAI is conducting an assessment of research and institutional needs to cope with the effects of climate change on Andean biodiversity. This is a significant step towards a comprehensive analysis in the face of adaptation needs: for planning future research and adaptation it is as important to chart institutional capacities and government commitments as it is to define the biophysical relationships between climate and biodiversity.

Collaborative Research Networks were developed to link scientists and institutions on the continent. The success and uniqueness of the first series of Networks from 1999 to 2005 provided an opportunity to build a strong international and interdisciplinary science program that responded to demand for problem solving research, and aimed at collaborations across natural and social sciences. To further strengthen human dimensions research, the second CRN program (2006-2011) was linked to a Small Grants Program for the Human Dimensions (SGP-HD, 2007-2009) which also

served to connect different CRN II projects with similar human dimensions issues. The combination of these programs provides an opportunity to analyze interactions between biophysical and human systems and integrate knowledge towards formulating responses to the challenges of global change.

The CRN program has developed into synergistic networks throughout the Americas: scientists and institutions working together on a wide range of global environmental change issues in an integrated and collaborative fashion.

The multidisciplinary and multinational networks are now generating important scientific information beyond the objectives of the individual projects to help in the mitigation of and adaptation to global environmental change and its impacts on our societies.

Twelve CRN II projects started in July 2006 (see Projects, page 42). Since then, the IAI has been linking projects into thematic and regional clusters, creating a network

of networks. The CRN II program was designed to provide flexibility (and funding opportunities) for project expansions and for filling critical knowledge gaps as they appeared. So, a thirteenth CRN II project was approved in 2008, after it became clear that land use change in South America had attained dimensions large enough to potentially affect regional climate systems.

This new network on “Impacts of Land Use and Cover Changes on the Hydroclimate in the La Plata Basin” is developing 25 year (1980-2005) “hind-cast” datasets on land cover, regional hydrology and climate including the intensity and length of floods and droughts. The project feeds this information into regional climate models closely linked to the “La Plata Basin Regional Hydroclimate Project (LPB)” of CLIVAR-GEWEX of the WCRP.

The IAI’s 21 current collaborative research networks and human dimensions projects have attained a maturity and interconnection that permits a synthesis of global change science beyond individual project objectives.

These continent-wide knowledge networks have succeeded in addressing the major challenges of global change science:

- ▶ **to separate stochastic and cyclical climate patterns from trends that show consistent progressive climate change and its expected impacts.**
- ▶ **to provide knowledge on global change (beyond climate change) at regional scales at which answers and decisions are needed for development and adaptation.**

A neglected ecosystem: Dry Forests

The global nature of climate change effects became evident in regional trends of changing dry forest phenology²⁰²¹¹ when consistencies between the Northern and Southern hemispheres was recorded: 27 years of image analysis from the Advanced Very High Resolution Radiometer (AVHRR) showed lengthening dry season and reduced productivity for forests both further north and south of the equator, whereas tropical dry forests nearer the equator experience shorter dry seasons and increasing productivity.

To obtain accurate phenology time series (e.g. for the length of the wet, green season), remote satellite based and field based ecosystem analyses were used. Comparison of remote and locally sensed Normalized Difference Vegetation Index (NDVI) revealed that satellite sensors differ²⁰³¹; while PAL and FASIR series detected vegetation changes confirmed on the ground, they

¹

These and further numbers refer to network numbers. See Projects, page 42.

were ignored by GIMMS². The teams concluded that to improve satellite based analyses ground-truthing was a priority which compares remotely observed patterns with independent proof of change. Such comparisons should then be used to improve the physical or mathematical algorithms of image processing. Accurate remote sensing and subsequent mapping can now provide a dynamic characterization of land cover changes that are being used to feed regional climate models with data of changing albedo, water and energy fluxes²⁰⁹⁴. This is beginning to provide evidence of a feed-back from large scale landcover change to regional climate.

²

FASIR refers to the Fourier-Adjusted, Sensor and Solar zenith angle corrected, Interpolated, Reconstructed adjusted Normalized Difference Vegetation Index (NDVI). FASIR adjustments concentrated on reducing NDVI variations arising from atmospheric, calibration, view and illumination geometries and other effects not related to actual vegetation change.

GIMMS refers to the Global Inventory Modeling and Mapping Studies, an NDVI dataset that has been corrected for calibration, view geometry, volcanic aerosols, and other effects not related to vegetation change.

PAL refers to the NASA/NOAA Pathfinder Land data set, which includes red, infrared, and thermal bands in addition to the NVDI Index; inclusion of these additional bands improves discrimination between cover types.

Collaborative Research Network 2021 has developed the first maps on secondary and primary dry forest extent. The network's maps now serve as legal basis for landuse decision in Costa Rica. Time series analysis documented low deforestation rates in municipalities (Ejidos) closest to the Chamela-Cuixmala Biosphere Reserve in Mexico. Further from the Reserve, the dry forest ecosystem is highly fragmented, and fragmentation progresses under tourism and agriculture development in the absence of a regional policy for conservation. The project has proposed a network of "Ejido Conservation Areas" with payments for environmental services. Analysis by HD008 of past payments for ecosystem services, though, shows 50% lower effectiveness than commonly claimed because both payments and a lack of development and infrastructure have similar "conservation" effects. Joint analysis of ecosystem service payments and regional infrastructure now help to reformulate policies in Costa Rica and Brazil.

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Land use & ecosystem services

Extensive landuse change is beginning to affect regional ecosystem services ²⁰³¹. Water yield from afforested small watersheds in southern natural grasslands decreased by 50%, due to increased transpiration and lowered albedo (with pines the darkest, 30% below the albedo of grasslands). Under landuse conversion to agriculture, increased run-off and reduced transpiration have increased water storage by 800 mm in the western Pampas, as shown both by gravitational anomaly (GRACE) satellite measurements and seen in a 2.5 m rise in groundwater and a 24% increase in flooded area during 1997- 2001.

Changing moisture conditions are having serious effects on production and land management. Drought limits nutrient uptake and exacerbates the competitiveness of weeds, so that chemical weed control was more effective in improving crop

performance in Yucatan than any other management measure ¹⁰⁰¹. Similar drought effects, limiting nutrient uptake, were seen in Guatemalan coffee production ²⁰⁶⁰. In Guatemala, increased seasonality with excess rainfall also limited nutrient uptake by compromising oxygen supply to plant roots from late May to November.

Internationally competitive agriculture is highly adapted to its environment ^{HD014},

and even minor climate change will have economic impacts and may move crops out of ecologically and economically optimum range. Producers' adaptation to environmental change and risk does not include environmental responses ²⁰⁶⁰ but aims at income diversification, migration etc. - possibly because of a perceived lack of competencies in agronomic environmental knowledge and management ^{HD009}. As a

Minas Gerais, Brazil



result, there is no coherent strategy for environmental stewardship under change.

Since different production systems have different vulnerabilities and resilience, similar environmental impacts require differential solutions²⁰⁹⁴ adapted to the social context. NSF-funded science on landuse, hydrology, climate impacts and ecosystem function is therefore integrated with IDRC funded development research in collaboration with government agencies and producer organizations^{HD014}. Science-guided land user consultations are part of 2021, 2015, 2094 and several HDs. The science-policy interface is further developed in a regional, consultative assessment of climate change effects on biodiversity and ecosystems funded by the MacArthur foundation in the Andes, which has prompted some Andean governments to include biodiversity conservation in national climate change adaptation plans.

The importance of policy in landuse change is most pronounced in the desire to substitute “carbon-neutral” biofuels for fossil fuel. But, depending on prior land use²⁰³¹, C releases from grassland soils after planting

corn for ethanol may completely offset C gains from biofuel for at least 50 years. In 142 study sites, soil C sequestered by setting aside former agricultural land was greater than the C credits generated by corn ethanol over 40 years and had equal or greater economic net present value. Rational decisions on fuel substitutions and land use must therefore be based on combined analyses of biophysical and socioeconomic factors. ☒

Past climate change holds lessons for the present

Long-term variation shown in a 700 year record of tree-ring widths²⁰⁴⁷ allowed reconstruction of rainfall variability in the high Andes. The resulting record of drought is an important contribution to understanding present and future hydrological variability but also points to critical social impacts: in pre-Inca settlements at lower elevation, open villages were abandoned in the 14th century in favor of fortified sites with evidence of local warfare. The driest years in the tree-ring record

(1314 - 1315) coincide with the beginning of social change in the 14th century.

Analyzing streamflows, a step function is seen superimposed over the recent negative trend in precipitation in Chile²⁰⁴⁷. The regional streamflow record from 1906-2007 shows a relatively minor trend, but significant regime shifts occurred in 1945 (31% decrease in mean rainfall) and 1977 (28% increase). These steps coincide with well-known shifts in the atmospheric circulation across the North Pacific Ocean, the Pacific Decadal Oscillation. Projected atmospheric circulation changes in the mid-latitudes might therefore enhance the present negative precipitation trend introducing sudden thresholds. Such step-functions obscure trends but can also aggravate trend effects. The Palmer Drought Severity Index shows²⁰⁴⁷ increased drought risk for 1920-2002 compared to a reconstructed 1346-1919 record for the Andean Temperate-Mediterranean Transition zone (35.5°-39.5°S). Combined with regional trends and regime shifts this may create immediate challenges of adaptation^{HD004} in hydro-power production and agriculture. ☒

A vulnerable region: the Inter-Americas sea (Gulf and Caribbean)

IAI science networks provide opportunities for the upscaling of regional climate processes and effects. This complements the downscaling of GCMs and scenarios and provides reality-checks based on regional knowledge. Atlantic sea surface temperature (SST) ²⁰⁵⁰ and the Inter-Americas Sea Low-level Jet, which affects SST and moisture advection in the Caribbean may not be represented well enough in GCM scaling exercises but is a critical regional climate factor. The longest Atlantic sea surface temperature time series to date (440 years) based on an absolutely dated, annually resolved coral-based proxy record between 1552 and 1991, linked to independent records of paleo-hurricanes from coastal lagoon sediments and stalactite isotope composition show increased hurricane activity at warmer SST before 1550 and after 1750, and few intense storms for cooler SST from 1550 to 1700. Atlantic SST may be more important for hurricane activity than previously thought, but overlapping climate signals make forecasts difficult. Local measurements and models ²⁰⁴⁸ aim to reduce uncertainties in vorticity development and shear effects that limit the predictability of hurricane tracks and intensities and therefore reduce disaster preparedness and the ability to assess weather impact ^{HD005}. Amongst the impacts of hurricane are not only the well-known storm disasters but also the rainfall that in semi-arid parts of the region is critical to ecosystems and agriculture. ☒



Taking sediment core samples

Moving Ecotones

Under climate change, temperature gradients which are reflected in land cover and landuse are shifting. The Andean tree *P. australis* shows a unimodal optimum at intermediate altitudes of around 1800 m asl for tree vitality, radial growth, seed productivity and seed mass²⁰⁰⁵. Seed germination and seedling survival, though showed increasing trends with altitude (*in in-vitro* tests). A rise in temperature due to climate change could restrict *P. australis* to the uppermost altitudes, where conservation of these forests would have to be a priority.

Ecosystem boundaries are often defined by climate gradients or transitions but are also affected by land cover history. In the high Andes²⁰⁰⁵, there are clear differences in vegetation structure between the forests located at different altitudes: continuous forests, forest tongues and forest islands at higher elevations. Forests islands may therefore not be relicts of former continuous forests but advance foci of trees colonizing

open Páramo under climate change. Some areas are already experiencing an up-slope advance of the treeline. The process, though, depends on landuse history as much as on climate. Comparison of abandoned agricultural plots with natural

areas along the treeline show a change in vegetation composition in successional areas towards typical species of the open Páramo: agricultural disturbance seems to induce a downward displacement of open alpine vegetation into the continuous forest,



counteracting an upward movement of the treeline under warming.

Ecosystem boundaries are “mobile” in other environments as well ²⁰⁰⁵. Pollen, spore and charcoal analysis of a sediment from Southern Brazil dated to 590 yr BP shows considerable small scale changes from grassland to forest and back. Forest expanded either gradually from its borders

or by nucleation. Small rock outcrops often served as nucleation points of Araucaria forest over Campos grasslands. Since the microclimate and edaphic characteristics under the crown of adult individuals of Araucaria is not significantly different from those under shrubs or open grassland, Araucaria are mostly important as a perch, and bird droppings then help establish other species. This is an example of

functional traits being more important than species properties in understanding community assembly patterns. CRN2005 is generalizing such insights in a spatially explicit, object-oriented model, using cellular automata, to simulate vegetation dynamics in forest-grassland mosaics. The measurement of ecological limitations then can help create distribution maps based on biophysical conditions. ☒

Ecosystem function and change

The effect of increased CO₂ on plant performance has been documented mostly for herbaceous plants and crops. *Araucaria angustifolia* also is sensitive to the increasing atmospheric CO₂ levels and responds by improving its efficiency in carbon assimilation²⁰⁰⁵. But that may not lead to better performance in the landscape since changes in water use efficiency combined with lower precipitation may produce growth decline. Growth ring analysis has also indicated that recently there has been a reduction in trees' sensitivity to CO₂, which resulted in growth decline. One might expect, that below-ground ecology shows a slower response to environmental change, but the analysis of DNA of dominant mycorrhizal taxa has shown seasonal shifts in species abundance as seen in the frequency of detection of different mycorrhizal fungi (AMF)²⁰¹⁴. In addition to abundance, function was also affected. Symbiotic ability of AMF declined in the warm season so that no significant relationship between AMF and their host plant was found under warm and dry conditions. This indicates that climate change can have significant below-ground effects that in turn affect plant performance.

Managing ecosystem transitions under landuse change or climate change depends on functional understanding. Successional stages in recovering dry forests²⁰²¹ differ in most ecological aspects. Differences in species composition, diversity, life forms and richness among the stages probably explain the differences observed in phenological patterns, functional traits and biotic interactions. The role of ecosystem function in the provision of environmental services, and social and economic development makes it important to provide measures of when a given ecosystem function returns to pre-disturbance levels during a succession. Understanding of functional units and functional groups may be more important in this context than understanding species attributes. This is made difficult,

Araucaria in pasture lands, Brazil



though, in highly disturbed landscapes because the first stages of succession have a greater stochasticity, greater variation in species composition among coetaneous sites, than in older stages where deterministic factors can be more important in defining species composition. Community based ecosystem attributes, such as nitrogen content may be useful as integrative indicators of ecosystem performance in system comparisons ²⁰¹⁵.

In the course of assessing ecosystem function, the important role of ecosystem services have alerted several research groups to social impacts and have resulted in extensions of CRN research. The Tropi-Dry ²⁰²¹ team in the Serra do Cipó (Brazil) did not plan on having a social component. Yet, it found itself with a unique opportunity to obtain the first data on the use of dry forest natural resources by rural communities and developed a project on “Use and management of forest fragments by rural communities in Serra Cipó”. Seventeen families were interviewed and a manuscript is being prepared for submission in the Acta Botanica Brasilica. ✎

Unifying approaches

Detecting critical changes in seasonality, phenology and land cover needs detailed local, but also regional and global information to permit intelligent up- and down-scaling of knowledge on global change effects. Following the successes in monitoring dry forest phenology, a network of phenology monitoring towers and ground sensors was initiated in Argentina, Brazil and Mexico which is generating synergies and adding value to several terrestrial ecosystem projects. Short courses on the applications of environmental sensors and on field spectroscopy build the capacity throughout the networks to generate comparable data and systematic knowledge. The IAI contribution to this activity has leveraged substantial co-funding from Academia and Industry.

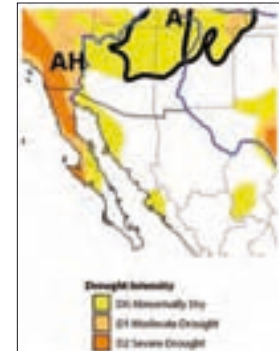


Bringing order to biodiversity

An open source computer tool has been developed in CRN 2015 to facilitate uniform biodiversity indexing across the continent and aid the integration of knowledge (<http://www.ecosystem-services.org/iaicrn2015/fDiversity.html>). CRN 2015 also co-developed a multistakeholder consultation on biodiversity and human well-being in Latin America and the Caribbean (together with ICSU, Diversitas and the IAI Directorate) which will serve to set goals for biodiversity research under global change. The resulting scientific integration goes well beyond the CRNs, creating durable continent-wide collaborations. ☞

Communicating science

The human dimension project on information flow and policy has developed its Border Climate Summary/ Resumen del Clima de la Frontera “ (BCS/Resumen) from prototype to a quarterly operation product. BCS/ Resumen is a dissemination tool that allows climate and water information to flow to policy-makers. It is housed on the University of Arizona’s Climate Assessment for the Southwest website (<http://www.climas.arizona.edu/forecasts.html>), with a link on the CICESE Web site (Ensenada Center for Scientific Investigation and Higher Education). More than 1,500 stakeholders and academic colleagues receive notice of the “BCS/ Resumen” through the CLIMAS-News listserv and the Monsoon Region Climate Applications listserv.



The booklets published jointly by the CRN I project on landuse change in semi-arid Americas and a regional NGO, AS-PTA (Assessoria e Serviços a Projetos de Agricultura Alternativa), which promotes capacity building and information exchange about agroecology among communities of family farmers in NE Brazil. One of the lessons learnt by the CRN team was that interactions with the NGO made it much easier to communicate effectively with farming communities .

In the past decade, the coffee sector has suffered a series of negative impacts: hurricanes, droughts, floods and landslides, decreasing soil quality, and national and international price volatility. These factors have been a source of risk and uncertainty for coffee growers in Central America and Mexico. To respond to such challenges, coffee growers depend on their own knowledge and experience, financial resources such as access to credit, external support, insurance, income diversification, etc., and the social assets such as producer organizations. This social capacity is vital given the small production scale, the needs for reliable market information, access to new markets and production know-how for instance for high-quality or organic niche markets. A policy brief “Strengthening adaptation capacities of coffee growers in Mesoamerica under global change”, produced by CRN 2060, provides pointers on how growers may face global change successfully.



Awards to IAI researchers

The young man and the sea

Alberto Piola (PI CRN 2076) received the “Hombre de Mar” distinction from the International Federation of Maritime Associations and Navy Leagues (FIDALMAR) for the presentation on “Oceans and climate change” in at the XXII Meeting of FIDALMAR in Valencia, Spain, 2007.

Excellence in writing

Sandra Diaz, Fabien Quétier (CRN 2015) and invited scientist Sandra Lavorel have received the 2007 PNAS (Proceedings of the National Academy of Sciences) Cozzarelli Prize, an award for papers that reflect the highest standards of scientific excellence and originality. Papers receiving the Cozzarelli Prize were chosen from more than 3,600 research articles published by PNAS in 2007.

María Bertolotti, Juan Buono, Marcelo Acha, Claudia Bremec and Hermes Mianzan (CRN 2076) received the Best Article Prize

International Institute of Informatics and Systemic for the presentation of the BioMare system at the 6th Latin American Conference in Systems, Cybernetics and Computer Science, Trimming, FL, July 2007.

José Paruelo (CRN 2031) was distinguished by Elsevier with the Scopus award 2007 for highest citation impact among Argentine scientists

Arturo Sanchez-Azofeifa (PI CRN 2021) was awarded the best paper award from the International Journal of Remote Sensing for his contributions on the differentiation of spectral properties of lianas and trees and the 2007 Canadian Forest Service Merit Award for his contribution to Land Use/Cover Change monitoring efforts (both related to the IAI project).

“My work in the team was to provide all the deforestation analysis based on satellite analysis that went into the model, which ultimately demonstrated that deforestation was, in fact, not a factor in the disappearance

of frogs in Monteverde. That led, in turn, to the whole theory of climate change...”
ScienceWatch.com correspondent Gary Taubes (<http://sciencewatch.com/inter/aut/2009/09-may/09maySCIAzof/>)

Late last year, the work of Dr. Sanchez-Azofeifa entered the top 1% in the field of Environment & Ecology in Essential Science Indicators from Thomson Reuters. His current record in the overall database includes 38 papers cited 633 times between January 1, 1998 and December 31, 2008 (Essential Science Indicators).

Jon Paul Rodríguez (CRN 2021) was awarded the 2007 National Prize for Best Science, Technology and Innovation Article in the Natural Sciences (shared with Jennifer K. Balch and Kathryn M. Rodriguez-Clark). Award given by the Ministry of Science and Technology of Venezuela on 23 November 2007.

Excellence in Research & Teaching

Sandra Díaz and Marcelo Cabido (CRN 2015) obtained the 2007 Taborda Award for Outstanding Achievement in Scientific Research of the Association for the Improvement of Education. As a result, their work was given extensive media dissemination.

Arturo Sanchez-Azofeifa was awarded a McCalla Research Professorship by the University of Alberta for his contributions to tropical research.

Nobel Peace Prize

As part of the IPCC team of authors, Esteban Jobbágy, Frank Viglizzo, Sandra Díaz, Marcelo Cabido, Ricardo Villalba and Holm Tiessen were co-recipients of the Nobel Prize for IPCC. 🌿

Investing in people

Capacity Building is to provide knowledge and know-how, develop collaborations and dialogue and improve communication. Participants in the IAI capacity building programs come from widely differing scientific, professional and cultural backgrounds, but all aspire to a new cooperative, multidisciplinary, politically relevant science across different disciplines and societal sectors. In its choice of themes, formats and audiences, IAI capacity building and training goes beyond the boundaries of "traditional" science education to better understand, predict, and adapt to environmental change.

Climate change & human health in the Americas

A training event in Mexico in January 2008 synthesized previous IAI health projects in order to chart future work and link research groups from different countries on topics of: links between climate variability and health variables; analysis of socioeconomic and ethical components of vulnerability to climate; development of vulnerability indicators to prioritize measures of adaptation and monitor success. Multidisciplinary regional studies of the climate-related ecology of disease transmission, that provide a cost-benefit analysis and integrate community and

sectoral organizations, were discussed in the context of potential early warning systems for the health sector and for disaster preparedness. Development of an interdisciplinary analysis, review of the concepts of early warning, and a focus on science application (e.g. linking health researchers to hospital and health centers) resulted in subsequent communication among participants and in two research and development proposals on climate and health to IDRC's Ecohealth Program and to the Inter-American Development Bank. Mexican scientists strengthened their collaboration with national health officials. ▣

Mainstreaming adaptation to climate change into environmental policy

The training event in Costa Rica brought together scientists from IAI programs and environmental practitioners from the International Union for Conservation of Nature, Red Cross, Conservation International, UNDP/GEF, the German development agency GTZ and CATIE. The 52 natural and social scientists and risk experts analyzed interactions between climate risks, and natural and human systems. Case studies in Latin America, that have been successful in reducing the vulnerability of communities, provided risk assessments for practical application to decisions on land use, biodiversity and water resources. Three principal tools for risk management and adaptation to climate change in water, land and biodiversity projects were introduced during the course:

CRISTAL (Community based Risk Screening Tool Adaptation and Livelihood) is a decision support tool to assist project planners and managers to integrate risk reduction and climate change adaptation into community-level projects. It helped participants

to understand the links between local livelihoods and climate; assess a project's impact on livelihood resources important to adaptation; and devise adjustments that improve project impact.

VCA (Vulnerability and Capacity Assessment) was developed by the Red Cross to collect and analyze information and develop sustainable solutions to community problems. VCA applies a series of participatory information gathering techniques that allows a better understanding of the vulnerabilities and capacities in the community. Some typical VCA tools are risk and hazard mapping, capacity and resources mapping, historical visualization and participatory analysis.

DesInventar, created by La RED (The Network for Social Studies on Disaster Prevention in Latin America), provides disaster inventories. Data collection and analysis methods are based on open-source software to assess disaster trends and their impact on communities. Reports, charts, and maps generated by DesInventar allow analysis

of patterns and vulnerabilities to improve prevention and preparedness. Many Latin American emergency agencies have introduced DesInventar for risk analysis, mitigation, and early warning.

The Training Institute led to a collaborative agreement between IUCN-Mesoamerica and FLACSO, and to a new project in Central America on "building capacity of the Central American society for tackling climate change" funded by the Danish International Development Agency (DANIDA). ☞



José Bonilla (Red Cross) presenting the methodology for the Analysis of Vulnerability and Capacities (VCA)

Remote sensing of hydrology in semi-arid regions

40 professionals from the public and private sectors, from social sciences, hydrology, meteorology, agriculture, and remote sensing communities from 7 countries participated in lectures and hands-on data explorations using INPE's "SPRING" software (free and open source). The group commented on the good support/help-systems and video-tutoring, but also noted that the interface still needs improvement and preprocessing of data at project level may have to be extensive. Integration of remotely sensed data into

studies on the conversion of natural savanna to agriculture, the effects of grazing and cropping systems on resource quality, soil moisture and the resulting dynamics of ground water depend on advances in the application of remote sensing to issues such as the estimation of evapotranspiration at scales of less than 500m, and the application of remote sensing to detect site quality such as primary productivity, water availability and soil properties. Such data can then be integrated into hydrological models for semi-arid regions. A particularly difficult issue are plains with no defined watersheds.

Participants of the Training Institute compiled information on various existing and potentially useful remote sensing & GIS data sources & products. See Remote Sensing & GIS Data repository table available at https://iaibr3.iai.int/twiki/pub/TISemiArid09/WebHome/tabla_de_Informacion.xls. In addition, an article on the "Current Situation of Arid and Semi-arid Lands in South America" has been published in the American Geophysical Union (AGU) Newsletter (v. 3, p. 6-7, July 2009), available at <http://www.agu.org/sections/atmos/Newsletters/ASnewsletterVol3No3.pdf>. 📄

Understanding climate change and variability in the Americas

The Research Internship Program by IAI and the Climate and Weather Research Center (CPTEC) of the Brazilian National Institute for Space Research (INPE) builds partnerships and multinational collaboration among Latin American researchers. INPE's experience and facilities for climate modeling offer visiting young scientists from different countries in the Americas opportunities to improve the understanding of climate change and atmospheric pollution. An

intern from Peru's Agrometeorology Office adapted a global climate model to Andean agriculture; another one, from the University of Buenos Aires, Argentina, used a mesoscale model to simulate and forecast contaminant transport and dispersion. That internship has resulted in a grant by the University of Buenos Aires to further develop the research and exchanges with CPTEC. The role of vegetation in the modeling of the effects of climate change and deforestation

on the hydrological cycle, related to savannization processes in eastern Amazonia, was the subject of a third intern. This is of continental importance since hydroclimatic variables of the Amazonian forest have a role in regulating the hydrological cycle in subtropical South America. ☒

Free and open sharing of data and information

The IAI charter demands the free and open exchange of scientific information and data towards informed decision making. The Institute is therefore working to improve information management and to develop a culture of data sharing in the IAI member countries. A training event in Panama in February 2008 brought together the

principal investigators and data managers of most IAI projects together with experts on data management and sharing from the Global Biodiversity Information Facility, the Large-Scale Biosphere - Atmosphere Experiment in Amazonia, CODATA and the Oak Ridge Mercury Consortium. Participants established a working group

to improve data integration, discovery, and interconnectivity; define protocols for data sharing among projects; develop metadata display and visualization tools; consider data policy and intellectual property issues; and provide input to Strategic Planning. This will continue to guide the information management of IAI projects. ☒

Global dialogue

Adaptation to and mitigation of global change requires policies and decisions that go beyond legislative periods and are designed to harmonize human development with life-support systems for both present and future societies. In a changing environment making decisions becomes a learning process linked to science. The needed dialogue between science and society is being promoted by the IAI.

United Nations Framework Convention on Climate Change (UNFCCC)

Since 2005, the IAI is an observer at the UNFCCC Conference of the Parties (CoP) and subsidiary bodies, and has engaged in the Subsidiary Body for Scientific and Technological Advice (SBSTA).

Article 5 of the Convention on “Research and Systematic Observation”, calls on UNFCCC Parties to support and develop international and intergovernmental programs and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation. “The SBSTA shall provide advice on scientific programs, international cooperation in research and development

related to climate change, as well as on ways and means of supporting endogenous capacity-building in developing countries”. As a key regional participant in this process, the IAI promotes its research efforts to seek strengthened participation of its member countries in IAI activities.

At a side event of SBSTA 24, the IAI provided a summary report (FCCC/SBSTA/2006/MISC.15) on its science program and contributed to a synthesis document which stressed the need for countries to work more closely with existing groups such as IAI, to identify specific projects to enhance research capacity, including data access and

development of data products appropriate to the limited computational and data management resources in developing and transition economy countries. In its second submission, at SBSTA-26 in 2007, the IAI highlighted synergies with the Ibero-American Network for Climate Change Offices (or Red Iberoamericana de Oficinas de Cambio Climático, RIOCC). Sixteen IAI member countries in Latin America are also RIOCC members. In collaboration with

RIOCC, IAI can explore climate change and adaptation issues of common-interest in Latin America. CRN 2050 Principal Investigator Dr. Kam-Biu Liu participated in the UNFCCC Expert meeting on Adaptation for Small Islands Developing States (SIDS), in Kingston, Jamaica in 2007. The IAI also introduced a policy-brief, developed with the Scientific Committee on Problems of the Environment (SCOPE), which identifies

mechanisms for policy-relevant science to guide scientifically-informed policy. In 2008, at SBSTA-28, the IAI organized a joint side event with the Asia Pacific Network (APN) on “Building joint capacities in science and policy sectors for environmental decision making”. Scientists and governmental delegates discussed how to foster a co-evolution of interdisciplinary science and inter-ministerial communication towards the decision-making needed to effectively



2009 UNFCCC Meeting Bonn, Germany

respond to Global Environmental Change. IAI speakers were: Julia Martinez Fernandez, Mexico (IAI Country Delegate) and Thelma Krug, Brazil (IAI Country Delegate) on “linking the climate convention to ministerial decision processes”, Brian Luckman (IAI CRN 2047) on “developing interdisciplinarity and science relevance” and Karen Tscherning (SENSOR) on “using IT based decision support tools as discussion support tools to develop the dialogue between research and policy making”. The IAI proposed (in document FCCC/SBSTA/2008/MISC.8) a pilot capacity-building project in association with the United Nations Educational, Scientific and

Cultural Organization (UNESCO) and the Scientific Committee on Problems of the Environment (SCOPE) during an Informal Dialogue session organized by the UNFCCC Secretariat.

At SBSTA-30, in June 2009, the IAI submission (FCCC/SBSTA/2009/MISC.5), summarized the successful progress of its IDRC funded network on “Land-use change, biofuels and rural development in the La Plata Basin” and included a brief on critical issues and trade-offs between the use of renewable carbon for fuel and for sustaining the associated land base. The IAI invited member countries to

support activities combining ecosystem and atmospheric carbon cycle research to guide decision making and reinforced its goal to involve member countries more closely in IAI-UNFCCC interactions. The document points out that the project directly responds to activities under the five-year Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change (NWP), by providing cooperation among Parties, relevant organizations and stakeholders and by encouraging South-South cooperation to facilitate knowledge exchange on lessons learnt from local experiences. ☑

International Human Dimensions Program (IHDP)

The IHDP fosters global environmental change research, capacity-development and science-policy interaction in thirteen projects and initiatives. IAI and IHDP have a tradition of cooperation. The IAI has sponsored the participation of young scientists from the Americas to IHDP events such as the International Human Dimensions Workshops (<http://www.ihdp.unu.edu/article/559>). Early-career scientists are one of the main targets of IHDP's capacity development activities and this constituted a crucial strategic contribution to build the

human dimensions research community in the IAI region.

Scientists from the Americas, both natural and social, need to become more proactive towards the policy impacts of their research. IHDP provides guidance towards linking science with policy, for example through its Science-Policy Dialogues, creating an environment in which researchers can design science that is policy relevant to both the public and the private sectors. Syntheses and cross-cutting themes such as modeling, governance, adaptation, and risk assessment can thereby be informed by practitioners needs throughout the research

process, and results presented in a public dialogue.

IHDP and the IAI concord that science-policy interaction needs i) the establishment of mutual learning activities, introducing scientists to policy makers' needs and policy makers about scientists' rules of engagement, ii) trust building, for example through training and capacity building activities, iii) engagement in trans-boundary science at the interface between science and policy for instance on the role of institutions in climate change adaptation, iv) provision of actionable science results while explaining uncertainties that need to be considered in decision making. ☒

Assessments and syntheses

The process of generating knowledge does not end with the individual science projects of the IAI. Projects have generated a large number of scientific publications and theses. Bringing scientists together to develop syntheses and crosscutting themes goes beyond these publications and provides additional new insights that add value to the original research effort. IAI has repeatedly teamed up with SCOPE, the Scientific Committee on Problems of the Environment, to develop syntheses of its science.



The book “Communicating Global Change Science to Society”, published by Island Press in 2007 as SCOPE series volume 68, analyzed the science relevance of past collaborative research networks and has guided the design of current science programs. It was edited by the IAI Director (Holm Tiessen), the former Assistant Director for Science Programs (Gerhard Breulmann), the former Scientific Advisory Committee Chair (Mike Brklacich) and one of the CRN I co-investigators (Romulo Menezes). A Spanish version will be published on the web in 2009. The book was used to develop the UNESCO-SCOPE Policy brief number 3 (2006) “How to improve the dialogue between science and the society”.

As society is becoming concerned about its future under global change, there is a realization that the effects of change will be unevenly distributed, and that the burden of adaptation will fall unevenly on different regions, countries and societal segments. To take action towards the needed adaptation, mitigation and regulation, policy must increasingly integrate knowledge based on scientific analyses. This means that science must be responsive to the needs of policy. It must provide predictions on the rate, shape and extent of global environmental change, and support decision making by exploring options for mitigation and adaptation. At the same time, science should be ahead of society's concerns and provide early warning of changes to come.

The analysis of the dialogue between science and policy during the IAI's first Collaborative Research Networks was designed to guide this process, and has helped shape the current research networks, their interactions and outreach.

Summary section of the IAI-UNESCO-SCOPE policy brief



A report on a training workshop on “Disaster Management and Risk Reduction associated with Climate Change and Variability” was produced in cooperation with the UN International Strategy for Disaster Reduction (ISDR), the Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC), the Regional Disaster Information Center (CRID), the National Authority of the Environment of Panama (ANAM) and the General Secretariat of FLACSO (Latin American School of Social Sciences). Further information at <http://www.crid.or.cr/> under reference: Identificador:16695 DES.

The first of a series of Occasional Papers has been posted on the IAI website in 2009. It deals with the increasing removal of carbon from agricultural lands for biofuels at the expense soil carbon and sustainability, and has been presented to the UNFCCC’s technical forum (SBSTA) This publication is available on the IAI website.

The e-book “Applying Ecological Knowledge to Landuse Decisions” was produced jointly by SCOPE, the Inter-American Institute for Cooperation on Agriculture (IICA) and the IAI. Edited by Holm Tiessen and John W. B. Stewart, synthesized knowledge from CRN I and CRN II projects on terrestrial ecosystems, forests, grasslands, agriculture and river margins, and explored how this may be used to guide decisions on landuse. It is available on both the IAI and SCOPE web sites (http://www.iai.int/files/Ecological_Knowledge.pdf)

Three issues of the IAI Newsletter with thematic focus have been published and are available in print or as pdf on the IAI site: 1/2007 on Capacity building; 1/2008 on Communication between science and different stakeholders; and 2/2208 on Interdisciplinarity.

An assessment of current knowledge on the impact of climate change on biodiversity of the tropical Andes will be completed by the end of 2009. This assessment, sponsored by the Mac Arthur foundation will guide future research, taking into consideration the institutional research capacities of the region. A resulting IAI-SCOPE volume is currently under review and will be published early in 2010. ☞



People

IAI Directorate



Holm Tiessen
Director



Rafael Atmetlla
Assistant Director: Finance & Adm



Christopher Martius
Assistant Director: Science Program



Marcella Ohira
Assistant Director: Capacity Building



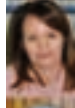
Luis Marcelo Achite
Manager: Information Technology



Ione Anderson
Manager: Science Programs



Luciana Londe
Assistant: Capacity Building



Roseli Luz
Assistant: Science Programs



Antonio de Oliveira
Driver



Ivan Donizetti de Oliveira Junior
Computer Programmer



Paula Richter
Publications Editor



Ana Claudia. A. Paiva Rosa
Executive Assistant



Tania Regina Freire Sanchez
Executive Assistant



Anita Soares
Accountant

Farewells

Claudia Cristina Fernandes
Assistant: Finance & Adm. and Capacity Building
has worked with us until October 2008

José Carlos de Souza Junior
IAI clerk
also left the IAI in October 2008

Gerhard Breulmann
Assistant Director for Science Programs
moved to the ITTO in Japan after 8 years
with the IAI

Luciana O Q. Ribeiro
Assistant to the IAI Director
moved on to new activities in June 2009

Isabel Vega
*Administrative Coordinator of the
Biodiversity in the Andes*
left in October 2009

Dione Negre
Assistant Capacity Building
left in October 2009

Scientific Advisory Committee

As defined in the Agreement establishing the IAI, the Scientific Advisory Committee (SAC) is the main scientific advisory body of the Institute. It makes recommendations to the Conference of the Parties regarding the Scientific Agenda, long-range plans and annual program of the Institute.

The SAC is composed of ten members elected by the Conference of the Parties. These members are scientists recognized internationally for their expertise in a variety of disciplines relevant to global change research.

Members are appointed for three year terms, with eligibility for a single additional term. Brief descriptions of SAC members bios can be found in the IAI Newsletters of 2007 and 2008.

Members of the Scientific Advisory Committee (June 2008)

Juan Valdes (Chair)
The University of Arizona, USA

Walter Baethgen
International Research Institute
for Climate and Society (IRI), USA

Telma Castro Romero
National Autonomous University
of Mexico (UNAM), Mexico

Rana Fine
University of Miami, USA

Maria Carmen de Mello Lemos
University of Michigan, USA

Luis Mata
University of Bonn, Germany

Ramon Pichs Madruga
Centro de Investigaciones de
la Economía Mundial (CIEM), Cuba

Harold Mooney
Stanford University, USA

Frank Müller Karger
University of Massachusetts Dartmouth, USA

Carolina Vera
CIMA/University of Buenos Aires, Argentina

Members who retired from the SAC from 2007 to 2009:

Silvia Garzoli
National Oceanic and Atmospheric
Administration, USA, 2002-2008

Mike Brklacich
Carleton University, Canada, 2002-2008

Conference of the Parties

The Conference of the Parties (CoP) is the principal policy-making organ of the Institute. It establishes, reviews and updates the policies and procedures of the IAI and evaluates its work and the accomplishment of its objectives.

Argentina

Carlos Eduardo Ereño

Ministerio de Ciencia, Tecnología
e Innovación Productiva
Comisión Nacional para el Cambio Global

Bolivia

Oscar Paz Rada

Ministerio de Planificación del Desarrollo
Programa Nacional de Cambios Climáticos

Brazil

Maria Virginia Alves

Instituto Nacional de Pesquisas Espaciais
Gabinete da Direção

Canada

Brian Gray

Charles A. Lin
Environment Canada
Science and Technology Branch

Chile

Maria Elena Boisier

Comisión Nacional de Investigación
Científica y Tecnológica

Colombia

Ricardo José Lozano Picon

Instituto de Hidrología, Meteorología
y Estudios Ambientales
Dirección General

Costa Rica

Roberto Villalobos

Instituto Meteorológico Nacional
Gestión de Desarrollo

Cuba

Bárbara Idalmis Garea Moreda

Ministerio de Ciencia, Tecnología
y Medio Ambiente
Centro de Gerencia de Programas Priorizados

Dominican Republic

Ernesto Reyna

Omar Ramírez
Secretaría de Estado de Medio Ambiente
y Recursos Naturales

Ecuador

Juan Carlos Parra

Pedro Montalvo
Secretaría Nacional de Ciencia y Tecnología

Guatemala

NO REPRESENTATIVE NOMINATED
BY THE COUNTRY

Jamaica

Leonie Barnaby

Ministry of Land and Environment

Mexico

Adrián Fernandez Bremauntz

Instituto Nacional de Ecología
Dirección General de Investigación sobre la
Contaminación Urbana, Regional y Global

Gerardo Arroyo O'Grady

Instituto Nacional de Ecología

Panama

Diana Argelia Laguna Caicedo

Autoridad Nacional del Ambiente
Dirección de Administración de Sistemas
de Información Ambiental

Santiago Lopez

Ministerio de Relaciones Exteriores
Departamento de Desarrollo Sostenible
de la Dirección General de Organismos
y Conferencias Internacionales

Paraguay

Constantino Nicolás Guefos Kapsalis

Universidad Nacional de Asunción

Fernando José Mendez Gaona

Universidad Nacional de Asunción
Laboratorio de Investigación de la
Atmósfera y Problemas Ambientales

Peru

Pablo Lagos

Instituto Geofísico del Perú

Uruguay

NO REPRESENTATIVE NOMINATED
BY THE COUNTRY

USA

Paul E. Filmer

Tim Killeen

National Science Foundation
Directorate for Geosciences

Venezuela

Gladys Maggi

Ministerio de Ciencia y Tecnología ☞

Executive Council

The Executive council (EC) is the executive organ of the Institute elected by the CoP for two year terms. Currently it is made up of Argentina, Brazil, Canada, Costa Rica, Cuba, Mexico, Panama, USA, and Venezuela. The composition of the EC Bureau is as follows, Paul E. Filmer, USA (Chair), Carlos E. Ereño, Argentina (First Vice-Chair), and Diana A. Laguna C., Panama (Second Vice-Chair).

2007-2009 meetings of the CoP and EC

- ▀ 24th EC - 14th CoP, Manaus, Brazil, 12-15 June 2007
- ▀ 25th EC, Arlington, VA, USA, 28-29 November 2007
- ▀ 26th EC - 15th CoP, Buenos Aires, Argentina, 17-20 June 2008
- ▀ 27th EC – 16th CoP – 28th EC, Bogotá, Colombia, 18-21 May 2009 ☞



Executive Council Meeting, May 2009, Bogotá, Colombia

The numbers

13 Collaborative Research Networks with 178 investigators in 98 institutions and 18 countries

9 of the 13 networks are led by institution and investigators in Latin America

the networks were selected from 94 proposals

USD 10,324,000 are provided by the US National Science Foundation for the 5-year program

USD 12,834,000 of complementary funding have been raised by the projects to date

807 degree students are part of the projects, 407 received scholarships from the grant

950 students participated in training events

The networks have produced 273 peer-reviewed journal articles and 72 books or book chapters

6 Small Grant projects for the Human Dimensions with 43 investigators in 29 institutions and 10 countries

These 6 projects were selected from 14 proposals; 2 additional proposals were integrated into CRN projects

for a total of 8 human dimensions activities supported

USD 800,000 are provided by the US National Science Foundation for 2 years (renewable)

USD 4,500,000 of complementary funding have been raised by the projects to date

59 degree students are part of the projects, 27 of whom received scholarships from the grant

261 students participated in training events

The projects have produced 25 peer-reviewed journal articles, 6 books or book chapters

the numbers (*cont.*)

The research project on **landuse change and hydrology in the La Plata Basin** with 29 investigators in 6 countries funded with USD 440,000 provided by IDRC Canada.

The assessment of **climate impacts on Andean biodiversity** funded with USD 450,000 by the MacArthur Foundation held 10 consultation and assessment meetings with 264 participants in 5 countries.

5 capacity building events of 10-14 days each were held with 166 participants from 23 countries funded with approximately USD 350,000 by NSF and others. ☞

Financial statements

Current research programs

Science and training programs as of June 2009

Programs	Number of Projects	Total Amount US\$	Period
Science Programs			
Collaborative Research Networks II	13	9,476,139	2006 - 2011
Small Grant Programs for Human Dimensions	6	767,945	2007 - 2009
Training Funds			
Training Institutes		300,000	2009 - 2011
NCAR		100,000	2006 - 2011
IAI Administered Funds		828,396	2006 - 2011
Grants Administered			
MacArthur Foundation	1	450,000	2008 - 2009
IDRC	5	425,310	2008 - 2009
Total	25	12,347,790	

Core Budget - 2009 / 2010

Member countries	Contribution Level (US\$) Approved for FY 09/10	Contributions (US\$) Due as of 01-Jul-09
Argentina	57,000	116,000
Bolivia	5,000	30,000
Brazil	100,000	120,000
Canada	143,000	214,500
Chile ⁽¹⁾	6,000	(3,000)
Colombia	11,000	40,000
Costa Rica	5,000	14,871
Cuba	5,000	30,000
Dominican Republic	5,000	65,000
Ecuador	5,000	45,000
Guatemala	5,000	65,000
Jamaica	5,000	30,000
Mexico	70,000	140,000
Panama	5,000	5,000
Paraguay	5,000	70,000
Peru	5,000	23,350
Uruguay	5,000	60,000
USA ⁽²⁾	691,000	954,072
Venezuela	37,000	251,000
Totals	1,170,000	2,270,793

1 Chile has paid contributions in advance

2 US funding for the current year has been made available, but is not shown as paid until funds are requested and received

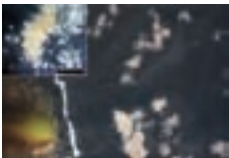
Projects



CRN2005
From landscape to ecosystem:
across-scales functioning in
changing environments
PI: Guillermo Sarmiento



CRN2015
Functional biodiversity effects on
ecosystem processes, ecosystem
services and sustainability in the
Americas: an interdisciplinary
approach (DIVERSUS)
PI: Sandra M. Díaz



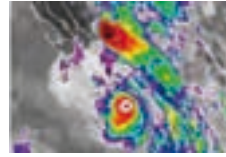
CRN2014
Functional links between
aboveground changes and
belowground activity with land use
in the Americas: soil biodiversity and
food security (AMFOODS)
PI: Ricardo Luis Louro Berbara



CRN2017
South American emissions,
megacities and climate (SAEMC)
PI: Laura Gallardo
and ADAPTE - Adaptation to the
health impacts of air pollution and
climate extremes in Latin American cities
PI: Patricia Romero Lankao



CRN2021
Human, ecological and biophysical
dimensions of tropical dry forests
(TROPI-DRY)
PI: Arturo Sánchez-Azofeifa



CRN2048
Tropical cyclones: current
characteristics and potential changes
under a warmer climate
PI: Graciela Binimelis de Raga



CRN2031 - Land use change in the
Rio de la Plata Basin:
linking biophysical and human
factors to understand trends, assess
impacts, and support viable
strategies for the future
PI: Esteban Jobbágy



CRN2050
Paleo-tempestology of the
Caribbean region: A multi-proxy,
multi-site study of the spatial and
temporal variability of Caribbean
hurricane activity
PI: Kam-biu Liu



CRN2047
Documenting, understanding
and projecting changes in the
hydrological cycle in the American
Cordillera
PI: Brian H. Luckman



CRN2060
Effective adaptation strategies and
risk reduction towards economic
and climatic shocks: lessons from the
coffee crisis in Mesoamerica
PI: Edwin Castellanos



CRN2061
Caribbean coastal scenarios (CCs):
an integrated analysis of Inland-
Coastal linkages to guide
sustainable use and protection of
coastal ecosystems
PI: Assefa Melesse



SGP-HD 003
Climate change and irrigated
agriculture towards a better
understanding of driving forces
and feedbacks between decision
makers and biophysical environment
and their impacts on hydrological cycle and land use
PI: Francisco J. Meza



CRN2076
An international consortium for the
study of oceanic related global and
climate changes in South America
PI: Alberto Piola
and Climate change, oceanographic
variability and the artisinal fisheries in the South West Atlantic
PI: Patr zia Raggi Abdallah



SGP-HD 004
Coming down the mountain:
understanding the vulnerability of
Andean communities to hydro-
climatologic variability and global
environmental change
PI: David Gauthier



CRN2094
The impact of land cover and
land use changes (LCLUC) on the
hydroclimate of the La Plata Basin
PI: Ernesto Hugo Berbery



SGP-HD 005
Information flows and policy:
use of climate diagnostics and
cyclone prediction for adaptive
water-resources management
under climatic uncertainty in
western North America
PI: Robert Varady



SGP-HD 008
Conservation policy impacts in
tropical dry forest: regional &
spatially focused analyses given
other social and natural drivers
of land use
PI: Alexander Pfaff



SGP-HD 009
Designing a methodology to
evaluate local knowledge on
global change and its role in the
construction of future land use
scenarios by local actors
PI: Jean-François Tourrand



SGP-HD 014
Decision support system (DSS)
for risk reduction in agriculture
phase II: soybean DSS for eastern
Paraguay and Rio Grande do Sul
PI: Clyde Fraisse

IAI Science Agenda

I. Understanding Climate Change and Variability in the Americas

- to observe, document and predict climate change and variability in the Americas and its links to changes in natural systems and societal impacts
- to understand the role of the ocean-land-atmosphere interactions in climate, to determine the key processes that cause climatic variability, from seasonal to decadal time scales in order to improve weather and climate predictions

II. Comparative Studies of Ecosystem, Biodiversity, Land Use and Cover, and Water Resources in the Americas

- comparative and integrated analyses of the effects of global environmental change on natural and anthropogenic systems and processes among tropical, temperate and cold latitude systems. increase knowledge of the drivers and dynamics of variability, and the impacts of such variability on food security, biodiversity and the provision of ecological goods and services. terrestrial, coastal and oceanic environments; and integration across the land/sea interface

III. Understanding Global Change Modulations of the Composition of the Atmosphere, Oceans and Fresh Waters

- to observe, document and understand the effects on productivity and human welfare processes that modify the chemical composition of the atmosphere, inland waters and oceans using a multidisciplinary approach

IV. Understanding the Human Dimensions and Policy Implications of Global Change, Climate Variability and Land Use

- to research the dynamic interaction of global change, climate variability, land use and human beings – their health, welfare and activities which depend on the productivity, diversity and functioning of ecosystems
- to address the complex interactions between natural and socio-economic systems through interdisciplinary approaches
- to inform public policies that increase sustainability of natural systems and human welfare

Inter-American Institute for Global Change Research

Av. dos Astronautas 1758

12227-010 SP - São José dos Campos, Brazil

www.iai.int

