

**3rd World Congress of Biosphere Reserves, Madrid, Spain
February 4-9, 2008**

Draft Report to the U.S. National Commission for UNESCO

Compiled by U.S. Participants
March 3, 2008

The Madrid Congress

The 3rd World Congress of Biosphere Reserves was held 4-9 February, 2008 in Madrid, Spain. There were 105 countries represented, and 829 participants including 20 from the U.S. (Appendix A), who helped to elaborate a Madrid Action Plan (MAP) to guide biosphere reserve research, education and management initiatives during the period 2008-2013.

The Congress emphasized the importance of partnerships to build capacity through UNESCO science and education programs, and of integrating programs to achieve common global and local goals such as sustainable development- a theme the U.S. National Commission for UNESCO has consistently emphasized as well. The Congress concluded that biosphere reserves are the principal means for achieving the objectives of the MAB Program and the visible instrument through which UNESCO as a whole can demonstrate its commitment to sustainability through policy-relevant site-based research, capacity building and demonstrations. There are now 531 biosphere reserves in 105 countries, including 47 reserves in the U.S. (Figure 1). A renewed U.S. Biosphere Reserve program, building on past experience, and benefiting from the synergy of exchange with other countries, could contribute significantly toward achieving these objectives, both for the U.S. and UNESCO.

Background

In 1973-1974, UNESCO expert panels, including leaders from the United States, expressed concern that major segments of the world's biota and valuable genetic materials could be lost, and that this would have profound significance for mankind. They determined that a major program should be launched to conserve natural areas, representative of the world's biotic regions. IUCN and UNESCO worked together to define the regions, and identify the national parks and equivalent reserves in each region (Biotic Provinces of the World. IUCN Occasional Paper No. 9, Morges, Switzerland, 1974). Of 198 provinces identified, 53 had no reserves, 29 had only one reserve, and 14 had only two. This initial assessment showed the need to focus conservation efforts in regions where little or nothing had been done. Since that time, more than 90 biosphere reserves have been established in those regions. Today there are 531 biosphere reserves in 105 countries- areas that are contributing to conservation, research, education and capacity building to improve land use and make human development more sustainable. In effect, the Biosphere Reserve program has added an important new dimension to the traditional conservation movement – sustainable development and land use compatible and complimentary with conservation of local/regional biodiversity.

Expert Panels on MAB Project 8: “Conservation of Natural Areas and of the Genetic Material They Contain,” which met in 1973 and 1974, determined that there should be an international network of “biosphere reserves” that would “conserve for present and future use the diversity and integrity of biotic communities of plants and animals within natural and semi-natural ecosystems, and to safeguard the genetic diversity of species on which their continuing evolution depends.” It was recognized then that a new dimension to traditional landscape protection was needed, and that conservation, research and education needed to be carried out in close cooperation with local communities.

In the 30+ years of the Biosphere Reserve program’s existence, there have been many achievements. The two most significant are that the number of conservation areas has increased considerably, especially in neglected, biologically diverse regions and that there is now a network of biosphere reserves that can provide important scientific information and foster collaborative research and education across a wide array of ecosystem types, management regimes, and socioeconomic settings. A few other examples indicate a spectrum achievements:

- **Southern Appalachians Biosphere Reserve (U.S.)**

The Great Smoky Mountains National Park and its cooperative relationships with communities, agencies and institutions in the region was used to illustrate the concept of biosphere reserves as the criteria for biosphere reserves were being developed in 1974, and the area became one of the first biosphere reserves designated in 1976. The Southern Appalachian Man and the Biosphere Program (SAMAB) grew from the initial biosphere reserve, paired with the Coweeta Hydrologic Laboratory (U.S. Forest Service), to today’s cooperative program, including six biosphere reserve units and cooperative activities in six states. SAMAB-participating agencies and institutions prepared the Southern Appalachian Assessment in 1995-6, and data from the assessment has helped communities and natural resource managers in the region to manage their resources more effectively. A website on Best Sustainability Practices <http://bpappalachia.nbii.gov/portal/server.pt> was created to document 70 Best Practices related to sustainable development and growth management in the Southern Appalachian Highlands.

SAMAB forums on air quality led to the development of the Southern Appalachian Mountain Initiative (SAMI)—a multi-agency, multi-state initiative led to a regional approach to air quality management. Because of such achievements, UNESCO recognized the area as one of the best examples of the biosphere reserve concept.

- **Golden Gate Biosphere Reserve (U.S.)**

The Golden Gate Biosphere Reserve (GGBR), originally established in 1988 as the Central California Coast Biosphere Reserve, represented a unique addition to the U.S. MAB Program. GGBR was the first U.S. biosphere reserve firmly integrated within a large metropolitan area that is home to over 8 million people. This is most clearly demonstrated by the large number of institutional participants: 11 federal, state, local, and private partners that incorporate over 200,000 hectares of land and marine habitat. This amalgam of participants allows for a remarkable range of opportunities from world class research at premier

biological field stations (Stanford University's Jasper Ridge Biological Preserve and U.C. Davis' Bodega Marine Lab and Reserve), to award winning public outreach and education programs (Golden Gate National Recreational Area and the Presidio Trust, and sustainable management of hydrologic resources (San Francisco Water Department and Marin Municipal Water District). All of these activities have been and can be further enhanced by biosphere status, but the logistics and challenges of coordinating such a complex amalgam of entities pose significant challenges that probably typify most biosphere reserves within an urbanizing landscape. Perhaps the most significant challenge and contribution of the GGBR is to develop innovative strategies for overcoming fragmentation of all forms: regional resource management, jurisdictional, habitat, and educational outreach.

- **Virungu Volcanoes Biosphere Reserve (Rwanda)**

The Virungu Volcanoes, in the Ruhengeri Prefecture in Rwanda, was designated as a biosphere reserve because of its significance as the countries most important watershed, and more notably, as the home of the mountain gorilla, an endangered species and unique resource. The region includes productive agricultural land but also high population densities, intensive land use and severe soil erosion.

Cooperative projects, supported by the U.S. Agency for International Development, and fostered by the UNESCO MAB program, were initiated in the 1980s to assist the Government of Rwanda to inventory physical, biological, and human resources, and initiate integrated resource management activities such as improved cropping systems (small farms) and tree planting projects. In spite of these technical assistance projects, local problems have increased, and greater efforts are needed to sustain these unique resources.

- **Mount Kulal Biosphere Reserve and the Integrated Project on Arid lands (Kenya):** Scientific studies of climate, soils, vegetation, water distribution, wildlife and domestic livestock, and on economic, social and cultural needs of local human populations were conducted and applied to improve land management and the welfare of pastoralists in the region. Drawing upon an excellent body of scientific information, such as biomass production of priority species for wildlife and domestic animals, and an understanding of the causes and effects of desertification, environmental education, training, and demonstration programs were developed that benefited people living in the region. This is a useful example for U.S. interests, and countries facing similar desertification problems.

- **U.S. - Mexico collaboration: La Michilia Biosphere Reserve (Mexico):** U.S. and Mexican scientists, local officials, and ranchers worked together, under leadership of the Mexican Institute of Ecology, to improve conservation of the natural resources of this region in Durango, and raise the economic standards of people living in and around the reserve. Activities included thorough assessment of the natural resources in the areas and of the district's needs, involving local people throughout the process. Improvements were made in local buildings and structures, using better designs and local materials. Apiculture was developed and improved; experiments in deer and cattle raising resulted in improved management practices. The success of this project, involving local people and

relying on leadership of scientists and cooperation of local government, set the stage for establishing other biosphere reserves, such as the Sierra de Manantlan, which focuses on conservation of the wild maize, *Zea diploperennis* (Teosinte), and other wild relatives and traditional races of maize, which have important benefits for mankind. This program is an example of multiple stakeholder collaboration.

- **Transboundary cooperation: Commander Islands and Aleutian Islands (Russian Federation and U.S.)**

A “sister biosphere reserve” partnership initiated in 2004 has provided both partners real benefits in the form of expertise transfers, expanding spatial and temporal scale of biodiversity monitoring programs, and joint work on common threats such as invasive species and oil spills. Participants from both countries at the Madrid Congress plan to expand this biosphere reserve partnership to address common issues and opportunities for collaboration.

- **San Joaquin Experimental Range Biosphere Reserve (U.S.)**

San Joaquin Experimental Range (SJER), designated a biosphere reserve in 1976, is a richly diverse area of grass-oak-pine woodlands in Central California, managed by the California State University at Fresno in partnership with the U.S. Department of Agriculture- Forest Service. Activities that are enhanced and expanded because of the areas status as a biosphere reserve include research, education and demonstration focusing on maintaining the integrity of the ecosystems of Central California. Specific activities include training of students in hand-on management of a beef herd on rangelands, and rotation of grazing areas. Education in this outdoor laboratory is a prime objective of the biosphere reserve. SJER was recently selected as a National Environmental Observatory Site (NEON) core site because of the significance of the research and education program.

- **Biosphere Reserve benefits and costs (Canada)**

Studies commissioned by Parks Canada in 2004 of benefits and costs in four biosphere reserve areas associated with national parks found considerable non-financial benefits such as the following:

1. Protection: Biosphere reserves helped municipalities to acquire data on natural areas within their jurisdiction; provided support for the ecological integrity of the greater park ecosystem; helped to acquire lands and conserve key species habitats; and reduced development pressures outside the park.
2. Research and monitoring: Biosphere reserves elicited external funding for research projects, attracted university researchers; operated forest biodiversity monitoring plots within the greater park ecosystem, and trained high school students in monitoring.
3. Biosphere reserves provided community forums to address local issues, showcase ecologically sustainable issues through workshops, and promote sustainable land use within the greater park ecosystem.
4. Education: Biosphere reserves supported and guided studies by university students; organized study tours; incorporated park-related themes into

local school curricula and developed environmental programs in local schools; trained municipal councils in GIS technology.

5. Regional cooperation: Biosphere reserves provided a mechanism to consult with and engage residents on regional conservation issues, and develop networks, partnerships and projects that assisted park managers.
6. Interagency cooperation: Biosphere reserves helped to mobilize resources for planning and management, in the park and surrounding region.

Financial benefits outweighed the financial costs, with an average net benefit of \$3,187 for the four parks in 2004. Park managers for these areas were unanimous in their opinions that involvement in biosphere reserves was well worth the costs. (Jim Birtch, Parks Canada. 2006)

The Madrid Action Plan (MAP)

The MAP identified three interrelated challenges to address during the period, 2008-2013:

- Accelerated loss of biological and cultural diversity with unexpected consequences that impact the ability of ecosystems to provide services critical for human well-being.
- Accelerated climate change with consequences for societies and ecosystems.
- Rapid urbanization as a driver of environmental change.

U. S. participation in the development and capacity building of the World Network of Biosphere Reserves is essential if these challenges are to be successfully addressed. The U.S. is embarking on global change science at many scales and disciplines and biosphere reserves provide places to test the ideas developed by this science in a great diversity of real world situations that involve public, private and non-governmental sectors working together in partnership. Biosphere reserves also provide excellent opportunities through the World Network for disseminating scientific knowledge to many stakeholders and their publics who are involved with biosphere reserves. Similarly, biosphere reserves are places to discover and explore the relevance and quantification of ecosystem goods and services, and to demonstrate to the public the value of ecosystem services in the day-to-day livelihoods of people. The MAP broadens the flexibility of individual biosphere reserves to relate international challenges and concepts to local situations, which has been a theme of U.S. biosphere reserves. MAP emphasis on science and education reinforces existing U.S. practices to conduct interdisciplinary and multi-scale science under the aegis of biosphere reserves and to provide the results of that science to the public in a variety of compatible formats. Today the U.S. can demonstrate its commitment to sustainability by reviving its biosphere reserve program and reconnecting with the partners in the World Network of Biosphere Reserves.

Partnership Opportunities

U.S. participants in meetings with representatives from other countries identified the following opportunities, described under the three interrelated MAP challenge themes:

- 1. Loss of biodiversity and ability of ecosystems to provide services essential for human well-being**

The Food and Agricultural Organization (FAO) estimates that about three fourths of the genetic diversity of crops has been lost over the last century. Biosphere reserves provide important habitats for managing and conserving priority species. Some contain wild crop relatives and traditional varieties, including rice, potatoes, tomatoes, beans, cabbage, coffee, bananas, citrus and other important species. Genetic materials valued for food production, timber, medicine, and industrial use, often require habitats found partially outside biosphere reserves, and on private properties. Former opponents of biosphere reserves in the United States, now agree that biosphere reserves can contribute to conservation of valuable genetic resources, and that private property owners should participate voluntarily in sustaining ecosystem services such as food and water.

To address this challenge, biosphere reserves should develop partnerships with farmers and ranchers, and with major programs such as the International Hydrological Program (IHP) to improve water management in biosphere reserve areas, and the Consultative Group on International Agricultural Group (CGIAR) Challenge Program on Water and Food. Biosphere reserve conservation (in situ) can be planned and carried out in close cooperation with multiple stakeholders including farmers and ranchers, botanical gardens, and arboreta (ex situ). Such collaborative programs, which are compatible, have never been planned on broad, international scales. The Biosphere Reserve network provides this opportunity.

Partnerships to develop a broad scale program on priority genetic resources in biosphere reserve areas, and World Heritage sites, should be developed by UNESCO, FAO, and the CGIAR International Agricultural Research Centers (IARCs). IARCs bring experience and expertise from extensive ecological and socioeconomic research. Biosphere reserves offer long-term protection of resources, and places where research, monitoring and education related to ecosystems services can be conducted, and the World Network of Biosphere Reserves can serve as a mechanism for information exchange and education, thereby contributing to the Decade of Education for Sustainable Development. Education is UNESCO's highest priority, and there is no more interesting and important subject than food and water. The first stage of the project would be information gathering about priority genetic resources and opportunities for expanded conservation and education in selected biosphere reserves.

- 2. Climate change with consequences for societies, ecosystems and biodiversity**
Many biosphere reserves have developed programs and tools to monitor climate, land use and biodiversity changes. These reserves can add value to climate change programs through the integrated approach that they apply to determine and demonstrate adaptation measures, and assist in mitigation strategies. For example, the Virginia Coast and Florida Coastal Everglades Biosphere Reserves and Long Term Ecological Research Programs have programs to study climate change and its impacts (rising sea level, land use change etc). Canada's Biosphere Reserves began a project on Adaptation to Climate Change in 1999, and several of their biosphere reserves are monitoring sea level change. Biosphere reserves on both

the Atlantic and Pacific coasts and islands can provide opportunities that span climatic gradients from Canada to Mexico and Central America and the Caribbean. Non-coastal biosphere reserves are also positioned to examine the implications of climate change for biodiversity at biome and interbiome levels. Mountain biosphere reserves, for example, are extremely vulnerable to global change, with dramatic impacts such as glaciers melting. The GLOCHAMORE (Global Change and Mountain Regions) program, in which Canada is participating, is being carried out in partnership with a number of programs including the Mountain Research Initiative, the International Human Dimensions Program on Global Environmental Change, and the International Geosphere-Biosphere Program.

The Division of Ecological and Earth Sciences in UNESCO has been given the role of managing the UNESCO Task Force on Climate Change, so development of plans for participation of biosphere reserves will be guided by this Division. UNESCO, DIVERSITAS and NASA are also in the early stages of planning a global Biodiversity Observation Network under the Group on Earth Observations GEO (<http://www.earthobservations.org/>) The World Network of Biosphere Reserves should be an active part of this program to collect data on the status and trends of the world's biodiversity, and the impacts of climate and landscape change.

The Smithsonian Institution Monitoring and Assessment of Biodiversity Program (SI/MAB), which since its inception in 1986 has helped to develop research and education capacities in biosphere reserves, can help bring these major programs together into more effective partnerships. Under the Smithsonian Center for Conservation Education and Sustainability, SI/MAB has engaged in strategic partnerships with governments and other organizations to provide leadership in conservation, and professional training and research. In partnership with UNESCO MAB and others, SI/MAB has developed standard protocols and methodologies to assess and monitor biodiversity within a global network of more than 300 research sites. The Program has focused on research and monitoring in sensitive areas where biodiversity is poorly known and biological data are needed to assist in making sound decisions regarding natural resources management. This Program is also linked with the Smithsonian Global Earth Observation Systems, and the National Ecological Observatory (NEON) initiative.

3. Urbanization as a driver of environmental change

The rapid increase of large cities and the continuing transformation of the urban landscapes represent great challenges to ensure basic human welfare and a liveable environment. A number of world cities, including the U.S., are considering, or have applied, the biosphere reserve concept to significant areas within their jurisdictions, with the intention of using the concept as a tool for managing approaches toward sustainability. Approaches to apply biosphere reserve concepts, cooperative processes, and “zones of cooperation,” in urban

areas and regional planning, both in existing biosphere reserve programs, and in compatible U.S. MAB programs are being developed. World cities, such as New York City, New Orleans, Cape Town, Istanbul, Stockholm and Canberra, are in the process of applying the biosphere reserve concept to provide alternative models to planning sustainable regions. Another example of the potential of this approach is in the Gulf of California and the mega cities of San Diego-Los Angeles, California and Phoenix-Tucson, Arizona. There are seven biosphere reserves in this region (3 in Mexico and 4 in the U.S.) that can help in planning to sustain this important marine-desert environment. The Sonoran Institute and the International Sonoran Desert Alliance are well suited to facilitate this type of planning.

A more condensed example is found in the Golden Gate Biosphere Reserve, at the Presidio of San Francisco. This 1500 acre reserve, right on the Golden Gate, has a commanding presence on the edge of the Pacific Rim, and acts as a mini city within the city, and in some ways as a mini-biosphere reserve. It has residents, businesses, large recreational facilities (golf course, ball fields, etc.), its own water source (Lobos Creek) and its own water treatment plant, remnant native plant habitats, (4 endangered species, 16 rare species); toxic landfills are in the process of being re-mediated and a water recycling (sewage treatment) plant is being constructed. The Presidio is an example of how an urban area can act as a model of how large cities could function in more sustainable ways. An advantage of a biosphere concept operating in an urban region is that it offers outreach capacities to educate people who do not have access to more remote biosphere reserves, have never heard of the concept, or have not heard of sustainable development.

Water Partners

The Madrid Congress hosted several important workshops/discussions exploring how water is a fundamental, connecting driver, both in terms of ecosystem services and maintaining biological and cultural diversity. Successful, sustainable management of water resources is generally allied with maintaining native biodiversity and often based upon small-scale, local traditional practices, such as rainwater harvesting. In addition, native biodiversity is generally an important measure for assessing water quality and successful management of local and regional hydrologic systems. Water is likely to be the most critical and direct link between the three interrelated challenges identified by the Madrid Action Plan. Sustainable and equitable water management is essential for biodiversity conservation, as well as cultural, social and economic well-being of human populations around the world. Partnerships between various biosphere reserves with similar hydrological challenges, as well as with existing international initiatives, such as the RAMSAR Convention on Wetlands, HELP (Hydrology For the Environment, Life and Policy), various programs in IHP, including the newly formed UNESCO-IHP project on Water and Cultural Diversity, will be instructive. UNESCO MAB is well positioned to develop an explicit Fresh Water Initiative to form these links and address the issues.

Partnership meeting with Mexicans and Canadians

On Thursday, February 7, 2008, a special meeting was held of more than 30 biosphere reserves representatives from Mexico, Canada and the United States to discuss interests and partnership opportunities to address emerging challenges such as climate change, loss of biodiversity, and conservation of migratory species. (See Appendix B for list of participants.) There appeared to be unanimous support for transnational and transborder cooperation in biosphere reserves, and to initiate activities such as the following:

- Conservation of migratory species: birds (more than half of breeding birds in Canada and U.S. migrate to Mexico, Central and South America during the winter); marine mammals (each country has biosphere reserves concerned with marine mammal conservation); and monarch butterflies (which migrate from Canada and U.S. to winter in biosphere reserve areas in Mexico)
- Climate change: monitoring of sea level changes, and adaptation to impacts of change (as described in no. 2 challenge above); Summarize climate related natural resource issues documented in biosphere reserves in North and Central America and the Caribbean to look for latitudinal trends.
- Sustainable communities and tourism: For example transborder collaboration between Organ Pipe Cactus Biosphere Reserve (U.S.) and Pinacate Biosphere Reserve Mexico facilitated by the Sonoran Institute and the International Sonoran Desert Alliance would focus on education for community officials on both sides, and development of Geotourism- a model supported by the National Geographic Center for Sustainable Destinations. Both sides want to develop a program that will help to alleviate the pressures of tourism, illegal immigration, and other activities that affect the communities and the environment.
- Biosphere reserve community-to-community exchange: To enhance international understanding, collaboration and capacity building in biosphere reserve areas. Community-based collaboration focusing on education and best sustainability

practices was recommended. (see web site on Best Sustainability Practices under S. Appalachians Biosphere Reserve)

Jim Birtch (Canada) extended an invitation to anyone in the group to attend the annual meeting of the Canadian Biosphere Reserves Association that takes place in two biosphere reserves on Vancouver Island—Mt. Arrowsmith and Clayoquot Sound—on 5-8 June, 2008. This meeting would be a good opportunity to get to know more about Canada's biosphere reserves and further the development of collaborative opportunities such as the above.

Participation of U. S. scientists, universities and biosphere reserve partners in UNESCO international programs in the tropics

The Madrid Action Plan and other initiatives such as GRASP (UNESCO and UNEP's Great Apes Survival Project Partnership) present important opportunities for U.S. participants at international biosphere reserve sites, especially those in tropical forests:

- Biosphere reserves serve as learning centers and provide support for research, education and capacity building. They provide partnership opportunities for U.S.-based universities, and graduate students. These opportunities are nowhere greater than in the tropical forest regions where existing scientific capacity is low and successful models for sustainable conservation, forestry, agriculture and environmental management are desperately needed.
- The ability to implement long-term programs under a UNESCO umbrella in biosphere reserves allows comprehensive participation by U.S. scientists and institutions, providing opportunities not only for U.S. science and scientific training, but also for foreign students that enrich U.S. educational institutions.
- Political support by in-country UNESCO offices and MAB committees allow U.S. scientists involved in natural resources and environmental management to conduct research and engage local partners in mutually beneficial activities.
- U.S. leadership in tropical forest biodiversity research and conservation, climate change and carbon storage, and other pressing challenges is enhanced by our participation in these biosphere reserve partnerships and the scientific policy documents that emerge from them.
- The net result from active participation would be affirmation of U.S. scientific leadership in these educational and policy initiatives that focus on environmental sustainability, and the cross-pollination for creative U.S. private enterprise on these issues.
- On the other hand, without U.S. participation in MAB and the World Biosphere Reserve Network, these opportunities fall to foreign partners who reap the scientific, educational and funding benefits, while the U.S. loses. There is strong anecdotal evidence that this has happened at international biosphere reserve sites over the last decade.

Sovereignty and property rights issues

Some members of Congress have opposed the U.S. Biosphere Reserve program because of concerns that biosphere reserves could violate U.S. sovereignty and the rights and interests of private property owners. At the request of the former Chairman of the House Committee on Resources (now the House Committee on Natural Resources), representatives of the U. S. Biosphere Reserves Association met with representatives of Sovereignty International, Inc., the leading opponent of biosphere reserves. After more than two years of constructive dialogue, the two sides agreed that the biosphere reserve program can make a significant contribution to conservation of ecosystems, species and genetic resources, and that private property owners should participate voluntarily, if the goals and functions of biosphere reserves are clearly defined, and that the U.S. program has Congressional approval. Reconstitution of the U.S. MAB Committee, and adoption of criteria for U.S. Biosphere Reserves, will help

Recommendations

U.S. participants suggest the following actions:

1. U.S. National Commission for UNESCO should reconstitute the U.S. National Committee for MAB to allow a coordinated effort to effectively interact within the national network and internationally in areas of research, ecological monitoring, land use practices and education programs. A united front will allow U.S. agencies and organizations to develop partnerships and funding strategies for national and mission-focused activities.
2. The MAB National Committee will elaborate Criteria and Guidelines for U.S. Biosphere Reserves (Criteria are incorporated in draft legislation to authorize the U.S. MAB Program), initiate a review of the U.S. Biosphere Reserves in collaboration with the U.S. Biosphere Reserves Association, and take steps to reengage with the World Network of Biosphere Reserves and many national and international and international organizations to advance research, monitoring and education programs.
3. The U.S. National Commission, U.S. MAB Committee, and participating agencies and institutions will support the workshops, task forces and other means, to develop biosphere reserve partnerships, such as those described above, in support of U.S. interests and priorities for conservation, education and sustainable development.



Figure 1. Biosphere reserves in the United States.

APPENDIX A:

U.S. Participants and Contributors

Barbara	Bond	H.J. Andrews Experimental Forest, LTER, Department of Forest Science, Oregon State University
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APPENDIX B:

Participants in the North American partnership meeting

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