



United Nations
Educational, Scientific and
Cultural Organization

Organisation
des Nations Unies
pour l'éducation,
la science et la culture



UNESCO - Using Space Technologies for the Conservation of Natural and Cultural Heritage



*An 'Open Initiative'
launched jointly by UNESCO
and the European Space
Agency at the International
Astronautical Congress,
October 2001*

Conservation a Conservation Tool

Assisting Developing Countries


'UNESCO is proud to serve as a 'catalyst' of this growing partnership of space agencies, research institutions, universities and the private sector. It is the concerted effort of all these partners that help release the full potential of space technologies for development by applying them to new fields such as the preservation of natural and cultural heritage of humankind.'

Koïchiro Matsuura
UNESCO Director-General



a Network of Partners

Space Technologies



UNESCO,
in Partnership with Space Agencies,
Bringing Access to

Space Technologies

for Developing Countries and
Building Capacity to Improve
the Conservation of the World's
Natural and Cultural Heritage

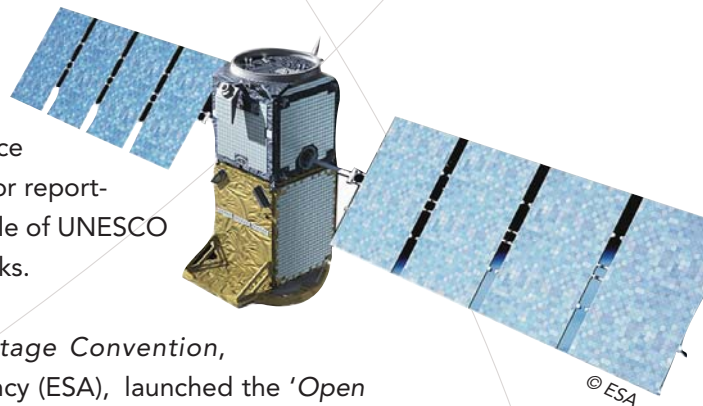


Our world possesses places as unique as the wilds of East Africa's Serengeti, the great Pyramids of Egypt, the Galapagos Islands and the temples of Athens. The extraordinary cultural and natural diversity of the world is an important source of life and inspiration for humanity. Its preservation should be a responsibility shared by the whole international community.

In 1972, the United Nations Educational, Scientific and Cultural Organization (UNESCO) General Conference adopted the *World Heritage Convention*. The Convention's aim is to identify natural and cultural places in the world with outstanding universal values, and to ensure their protection for the benefit of all of humanity through a closer co-operation among nations.

As signatories to the Convention, it is the countries themselves who have the primary responsibility for the maintenance of their natural and cultural places and for reporting on their state of conservation. The role of UNESCO is to assist countries in fulfilling these tasks.

To foster the goal of the *World Heritage Convention*, UNESCO and the European Space Agency (ESA), launched the '*Open Initiative on the Use of Space Technologies to Support the World Heritage Convention*'. The main goal of this initiative is to develop a framework of co-operation, open to: space agencies, research institutions, non-governmental organisations (NGOs) and the private sector. This is in order to assist developing countries, through, space technologies to improve their natural and cultural conservation activities. Among UNESCO's contribution to the '*Open Initiative*' is the creation of a Remote Sensing Unit to co-ordinate these activities.



Space Technologies - Conservation Tools

Today, natural and cultural sites face a variety of potential threats. These include uncontrolled agricultural and urban development, regional conflicts, natural catastrophes, climate change, excess of tourism, and so on.

Space technologies such as Earth Observation from satellites can play a significant role in observing, understanding and monitoring these threats. Satellites are able to cover vast natural sites that often span national boundaries and remain difficult to survey on the ground.

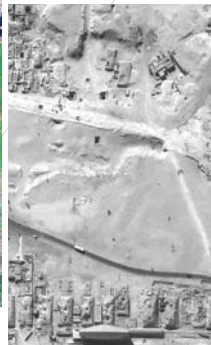
The high-resolution satellite imagery now available provides a powerful conservation tool for cultural sites for detecting changes to a site and its surroundings. The information derived from satellite images is very useful enabling site managers to strengthen daily conservation efforts.



Ankor Wat, Cambodia - IKONOS © Space Imaging



Mana Pools National Park, Zimbabwe © NASA GeoCover dataset



Pyramids, Egypt

Satellite Imagery and Data – a Daily Tool for Conservation, a Guide for Decision Makers

Developing countries frequently lack accurate cartography for their heritage sites this translates in difficulties to undertake a proper on-going monitoring. Satellite imagery can bridge this enormous gap.

Space technologies have an immediate multitude of applications for the improvement of conservation:

- providing on-going site monitoring to identify land use and land cover changes, emerging threats, improvements due to conservation activities or deteriorations due to the lack of;
- deriving simple easy-to-use on-site Geographic Information Systems (GIS) for the management of a site;
- integrating space technologies to derive accurate data and information to improve the Periodic Reporting process for the *World Heritage Convention*;
- using satellite images as a means to improve the information flow and communication among site managers and conservation authorities: *an image is worth a thousand words*;
- analysing regional environmental changes and human induced activities and the associated impact at site level;
- providing support data and information to improve the documentation, visualization and modelling of our natural and cultural heritage.

Capacity Building

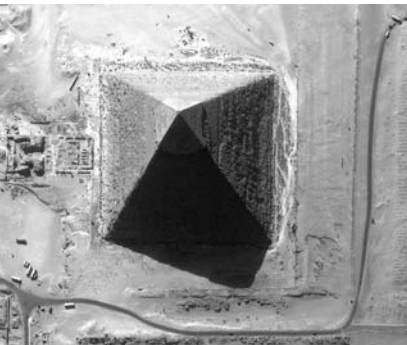
One of the main goals of this 'Open Initiative' is to assist developing countries in acquiring certain initial capacity to use space technologies for the conservation of their heritage.

This process is implemented by:

- developing joint projects in close partnership with the country responsible for the heritage site;
- holding workshops to familiarize local staff involved in site management with the enormous potential of space technologies when applied to the conservation of natural and cultural heritage.

Depending on the specific needs of each site, the UNESCO Remote Sensing Unit assists the country in:

- defining the overall requirements;
- identifying partners for the implementation of the associated activity;



IKONOS © Space Imaging



Taj Mahal, India - IKONOS © Space Imaging



Rio Platano, Honduras © NASA GeoCover dataset

- securing the necessary funding;
- coordinating the training of the local staff that at the end of the project will be handling all the information derived from satellite images.

Outreach and the Media

The concept of space technologies as applied to heritage conservation enjoys wide visibility. The fact that the 'Open Initiative' is bringing together a large group of space experts to assist in the conservation of World Heritage sites has attracted the press and media. This has resulted in broad coverage of the activities of this 'Open Initiative' in both newspapers and television reports.

Capacity Building



DEVELOPING COUNTRIES

One of the priorities of the 'Open Initiative' is to strengthen capacities at local levels through the use of space technologies to monitor natural and cultural sites. This is done by involving the end-users (local staff involved in site management) from the outset of a project and encouraging their participation in all stages.

In addition, through capacity-building activities, the end-users familiarize themselves with the benefits and limitations of space technologies and develop the necessary knowledge to handle and use satellite imagery and other technologies at sub-regional and national levels.

Capacity-building activities include organizing training for local conservation authorities and site staff, and introducing end-users to the potential use of satellite images and geo-positioning as applied to their daily conservation work in natural and cultural heritage.

The main outcome of these activities is to create the necessary know-how within local authorities for the usage of space technologies towards better conservation efforts.

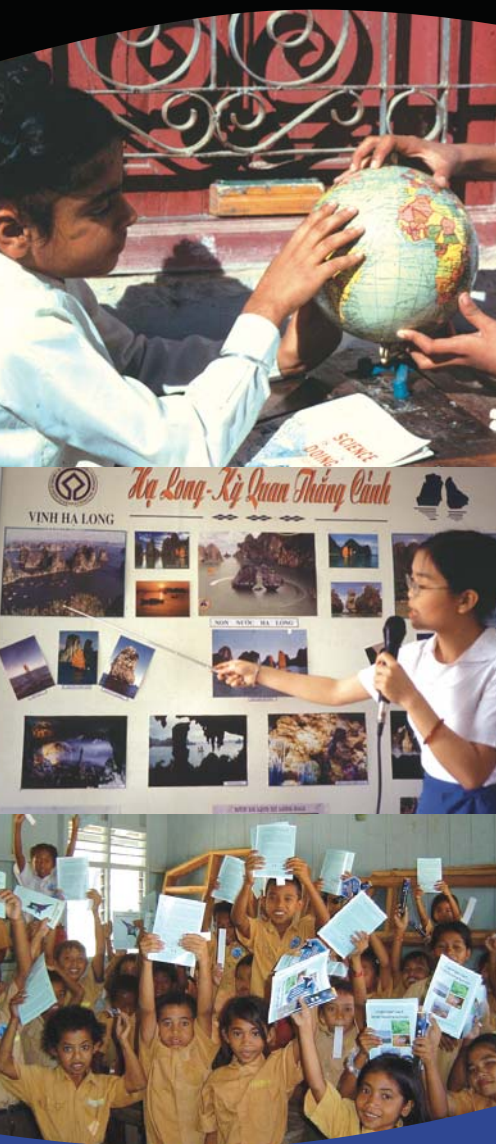
Several of these workshops have already been conducted in close cooperation with countries and experts from partner organizations: Master students in conservation (Strasbourg, France), Arab countries (Lebanon, Beirut), Latin American countries (CONAE-Cordoba, Argentina).



PARTNERS

These workshops are typically organized in partnership with the European Space Agency and UNESCO supported by the national space agency, national and regional conservation authorities, EURISY (a NGO raising awareness of the European space expertise), GEOSPACE (Austria), as well as the network of partners of the Open Initiative.

Space to Raise Conservation Awareness among the Younger Generation



OPEN INITIATIVE – YOUNG GENERATION

UNESCO's 'Open Initiative - Young Generation' educational activity involves partners of the 'Open Initiative', including major space agencies, conservation authorities and research institutions, to make use of space science and technology to create awareness of conservation among children.

P Within this activity, as part of the UN Decade of Education for Sustainable Development, UNESCO assists local conservation authorities to involve school children (age 12-15) from schools surrounding UNESCO Biosphere Reserves and World Heritage natural and cultural sites, in easy tasks of the field work required to support satellite image processing. Local school children are brought to UNESCO sites to:

- Observe with the support of a time series of satellite images how the site and/or its surroundings has changed since 20 years ago, 10 years ago and up to present;

- Understand from the site manager: the cultural and biodiversity values of the site; the importance to preserve these values; and the associated threats;

- Appreciate the link between the site's biodiversity and the local community's intangible heritage - including their food, handicrafts and traditional medicines;

- Participate in simple tasks during field trips to support the satellite image assessment, such as identifying clear marks in the ground (roads crossing); and noting the description where the experts are taking GPS points, etc.;

- Observe other satellite images that show changes occurring in key areas of their country and around the world – including major cities, lakes and forests;

- Learn from such experience what their local community is doing with respect to a reasonable use of the associated natural resources;

- Participate within the local community in activities associated with a sustainable use of the surrounding biodiversity.

The 'Open Initiative – Young Generation' promotes an exchange of information, beliefs and opinions between children on their local environment/culture and how to contribute to its long-term conservation. It raises awareness, pride and support from children in caring for their natural and cultural resources.

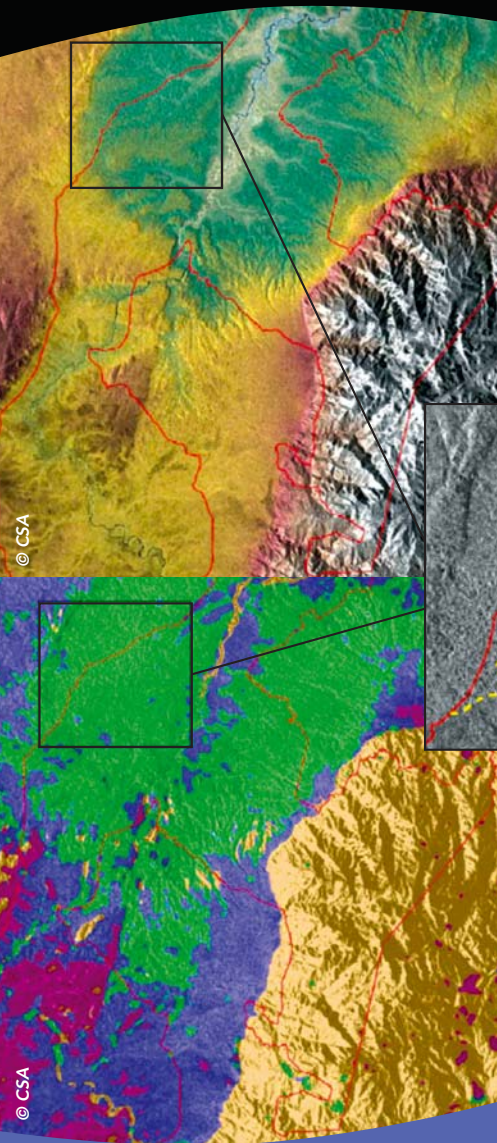
In addition, the activity facilitates inter-cultural dialogues between children around the world, by providing an excellent forum for cooperation and enhanced understanding of other cultures and other ideas and actions towards a sustainable use of the Earth's resources.

PARTNERS

CONAE (Comision Nacional de Actividades Espaciales, Argentina), European Association of Remote Sensing Laboratories (EARSEL), European Space Agency (ESA), University Corporation for Atmospheric Research (UCAR) and national conservation authorities of the selected countries.

Central Africa:
Democratic Republic
of Congo (DRC),
Rwanda and Uganda

Extracting Additional Features to Improve the Cartography for World Heritage Sites



LOCATION

As a partner of UNESCO in the 'Open Initiative', the Canadian Space Agency (CSA) assists UNESCO among other projects, with the associated coverage of RADARSAT images for UNESCO's activities in Central Africa.

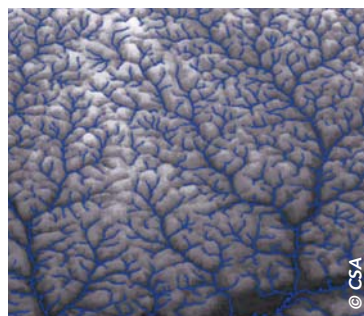
PROJECT RADARSAT-1 is a sophisticated Earth observation (EO) system to monitor environmental change and the planet's natural resources. Equipped with a powerful Synthetic Aperture Radar (SAR) instrument, RADARSAT acquires images of the Earth day or night, in all weather and through cloud cover, smoke and haze.

The Canadian Space Agency has sponsored a feasibility study to analyze the use of RADARSAT in the constantly cloud covered World Heritage sites in Central Africa. Three Canadian companies have been selected to do the feasibility study on the following:

- impacts of human induced activities (mining, deforestation, agriculture);
- park limits;
- hydrographics and road networks.

R E S U L T S

The results further confirm that optical satellite images are not enough when working in tropical areas. The added value of radar enables to extract additional features: river network, borders of the parks, deforested areas etc. and in some cases radar can detect human induced vegetation.



When the signal of RADARSAT-1 is diffused back to the satellite, it shows clearly the differences in the humidity of the ground. This technique enables the detection of a large number of rivers at the Salonga World Heritage site.

PARTNERS

Canadian Space Agency (CSA).

Deriving from satellite images a decision support tool for Gorilla Conservation

LOCATION

The habitat of the Mountain Gorilla is located in the Democratic Republic of Congo (DRC), Rwanda and Uganda. The area includes the World Heritage sites of Virunga National Park and Kahuzi-Biega National Park in DRC as well as Bwindi Impenetrable Forest National Park in Uganda. Although some parks are not yet inscribed as World Heritage sites, they are important because they constitute together with the previous mentioned sites the whole ecosystem of the Mountain Gorilla: Uganda's Mgahinga National Park and Rwanda's Volcanoes National Park.

PROJECT The habitat of the Mountain Gorillas is one of the geographical areas where the use of remote sensing is both essential and challenging. The geographical area is large. The terrain is mountainous and difficult to access, including some of Africa's highest peaks reaching over 5,000 m in altitude. The region is renowned for the diversity of its natural habitats and for the incredible wealth of wildlife. In this area nature conservation and the sustainability of natural resources are of utmost importance. The long conflict from which the region is slowly emerging has left painful rifts in

the social, economic and ecological fabric. Both conflict and the size of some of the protected areas, mean that only space technologies offer a solution to the problems of making overall environmental assessments.

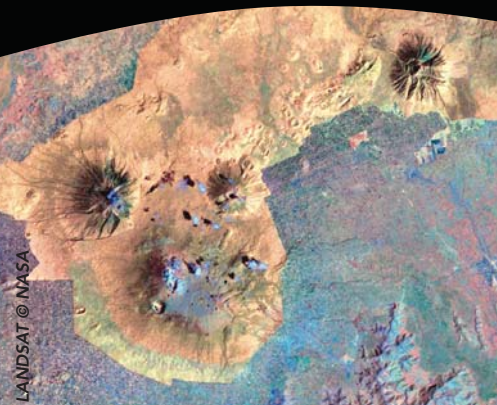
Thanks to a generous financial contribution of the European Space Agency, it was possible not only to extend the area covered by this initiative to include the Mountain Gorilla habitat, but the whole of the World Heritage sites and Parks hosting the Mountain Gorilla.

R E S U L T S

For the very first time, accurate basic cartographic products for the whole habitat area were produced, derived from satellite imagery. These included digital elevation models, vegetation and land use change maps, as well as 1:200.000 and 1:50.000 cartography. These products have been developed using the same standards for the three countries, making it possible to handle the habitat as a whole. A comparison of the satellite images taken over the sites between 1990 and 2003 has provided an accurate picture of the impacts on the environment caused by the large period of political unrest which resulted in the arrival of refugees, deforestation, the creation of new human settlements and, in some cases, forest regeneration.

The products, which are compatible with geo-positioning systems, allow national conservation authorities to track the gorillas and all flora and fauna and monitor any changes or degradation to their habitat. National conservation agencies assisted by a series of non-governmental organizations working in and around the parks can now identify the park boundaries, map their observations with respect to flora and fauna surveys, visualize movements of the fauna, and plan out gorilla-associated eco-tourism.

The project is also building the capacities of local conservation experts in the use of remote sensing and maps, which will ultimately help site managers, park rangers, conservation authorities and non governmental organizations to improve their understanding of the sites and contribute better to conservation.



LANDSAT © NASA



© J.Hart, WCS

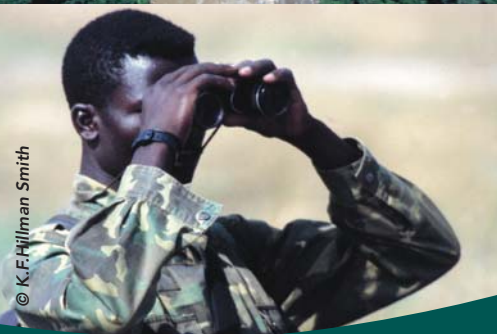


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PARTNERS

Main sponsor was the European Space Agency (Data User Element), Canadian Space Agency (CSA), Dian Fossey Gorilla Fund International (DFGFI), Institut Congolais pour la Conservation de la Nature (ICCN), Institute for Tropical Forest Conservation (ITFC), International Gorilla Conservation Programme (IGCP), Rwanda's Office of Tourism and National Parks (ORTPN), Uganda Wildlife Authority (UWA), World Wildlife Fund (WWF).

Using Satellite Images to Develop a Decision Support System for the Conservation of World Heritage Sites



© K.F. Hillman Smith

PARTNERS

Main sponsor and active partner is the Government of Belgium - Office for Federal Science Policy, the European Space Agency (ESA), Catholic University of Louvain, University of Ghent, Canadian Space Agency, Institut Congolais pour la Conservation de la Nature, Wildlife Conservation Society, WWF Africa.

LOCATION

Renowned for the diversity of its natural habitats and for the incredible wealth of wildlife that is a result of that diversity, the Democratic Republic of Congo is a country in which nature conservation and the sustainability of natural resources are of utmost importance.

With the generous contribution of the Government of Belgium, Office for Federal Science Policy, UNESCO, working in partnership with Belgium universities, obtained from satellite images accurate cartography for the World Heritage sites known as Salonga, Okapi and Garamba.

These sites added to those described in the gorilla conservation project completed the five sites for DRC. All these sites host to an extremely abundant biodiversity; unfortunately domestic difficulties and successive wars have caused certain damage to these sites, to the point that they are inscribed on the list of World Heritage in Danger.

PROJECT
The total lack of available cartography for all World Heritage sites at DRC was an enormous problem for conservation planning and implementation. It was extremely difficult for park rangers as well as for the Institut Congolais pour la Conservation de la Nature to manage these large areas without any forms of cartography.

The frequent use of GPS by the park rangers, for example, was hindered by the impossibility of matching the GPS points captured in the terrain to those on a proper map.

RESULTS

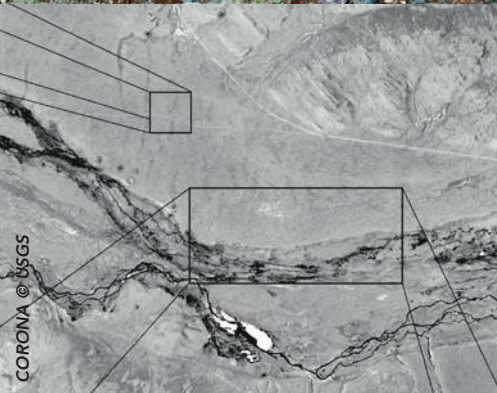
Thanks to the Belgium expertise, accurate basic cartography for Salonga, Okapi and Garamba was derived from satellite images. This information was then integrated with the maps derived for Virunga and Kahuzi-Biega. The resulting system, known as SYGIAP (in French Integrated Management System for Protected Areas), constitutes now an integrated decision making support tool, that is the current basis for conservation management at each of the five World Heritage protected areas in DRC, as well as in headquarters of the Institut Congolais pour la Conservation de la Nature.

With the assistance of the Belgian universities, capacity-building activities have been undertaken to familiarize park rangers with the use of a simple integrated cartographic management system. These capacity building activities are now being extended also to decision makers.

Non-governmental organizations (NGOs) that work closely with ICCN provided much assistance, data and information for this UNESCO project. UNESCO received a generous contribution from the UN Foundation that enabled to cover all ground activities.

Russia - Kazakhstan
Mongolia - China

Inventory and Preservation of Frozen Tombs in Yustid Valley, Altai Mountains



LOCATION

The Frozen Tombs of the remote Altai Mountains are an outstanding cultural discovery of the lost Scythian civilization that flourished in the first millennium BC. About 700 Frozen Tombs have been identified scattered all over the Altai Mountains across Russia, Kazakhstan, Mongolia and China. The Russian part of the mountains (Golden Mountains of Altai) is inscribed on the World Heritage List and the Katunskiy Biosphere Reserve (also in Russia) is classified as a Biosphere Reserve.

P Some of these tombs, or *kurgans*, are situated in a permafrost zone that enables their contents to be completely frozen and perfectly conserved. These spectacularly-preserved tombs include sacrificed horses, artifacts and utensils made of wood, sometimes extremely well preserved beautifully tattooed bodies and leather, cloth, silk, metal and gold.

R Due to climate change the permafrost that allows for the *kurgans* to be preserved is gradually disappearing, and therefore threatening the loss of the remaining tombs and the precious insights they provide into the ancient nomad Scythian culture.

J In a first phase in Russia, in a joint project of UNESCO with the University of Ghent, space technologies are being used to assist with the mapping, inventory and conservation of these unique frozen tombs. The project aims to use satellite images to create a geo-referenced archaeological inventory that fuses traditional field work, satellite image interpretation and Global Positioning Systems. Satellite images are also being used to understand eventual climate change consequences on the permafrost zone of the Altai Mountains by observing, during a reasonable period of time, the status of nearby glaciers. This information will assist the conservation authorities in establishing conservation priorities for each of the tombs.

E The result of the work to be performed will be a unique inventory of this cultural heritage.

PARTNERS

The main sponsor is the Government of Flanders (Belgium). University of Ghent - Departments of Archaeology and Geography, Gorno-Altai State University, Russian Academy of Sciences, Jet Propulsion Laboratory (JPL), Conservation authorities of Russia.

Observation and Safeguarding of Archaeological Sites through Satellite Imagery

LOCATION

Uruk-Warka, situated c. 300 km south of Baghdad, is one of the oldest metropolises of the Ancient World. It was inhabited from around 4000 BC to c. 400 AD and is known as the city where writing was invented, the home of the world's oldest epics, the Epic of Gilgamesh and where early state formation and administration was developed. The cultural site is enormous, already around 3000 BC the city had an extension of 5,5 km².

PROJECT
Excavations by German Missions started at the site in 1912. The German Archaeological Institute has been involved in on-going research, however, recently field work has had to be interrupted. To date, it is estimated that only 5% of the enormous city has been analyzed.

In 2001, a scientific project was launched to collect information that could provide better knowledge of the whole structure of the city. With the help of a geophysical survey, precious insights into structures buried under mud hills became possible. Cross checking of the new data with previous existing archaeological data enabled to date and to interpret all the structures.

Unfortunately, the site is currently under potential threat of illegal digging and associated looting.

In order to better monitor the site a new project has been initiated with the assistance of the German Space Agency (DLR) using recent satellite imagery. Methods of comparing satellite images with known ground data such as archaeological features, magnetometry imagery and topographical data are also being developed.

The study will help to estimate the state of preservation of the whole archaeological site as well as provide a view from space of the whole ancient infrastructure.

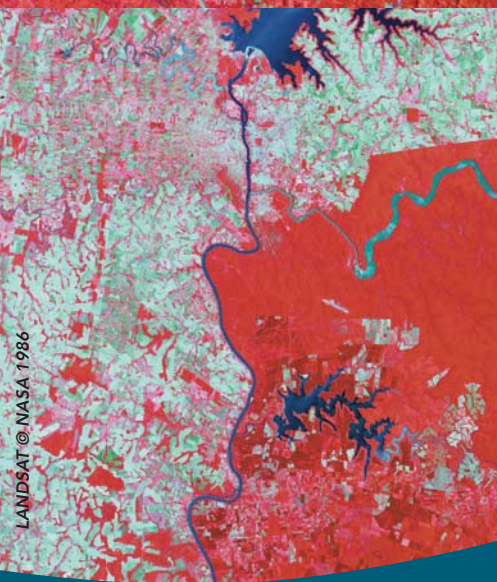
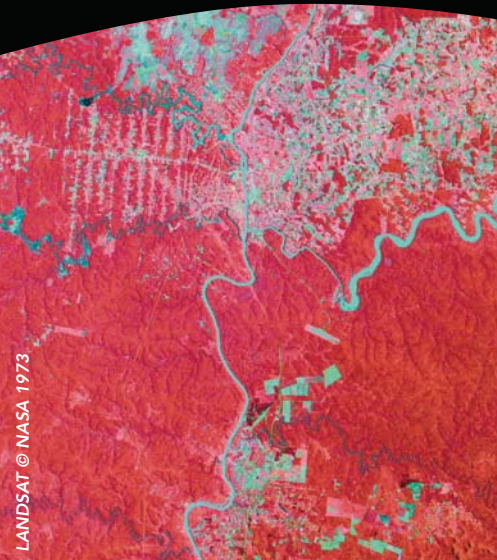


© DLR, European Space Imaging

PARTNERS

The project is financed by the German Federal Foreign Office and carried out in cooperation between the German Archaeological Institute, and the German Space Agency (DLR)

Biodiversity Conservation of World Heritage National Parks of Iguazu and Iguacu



LOCATION

Spanning the borders between Argentina and Brazil lies one of the most ecologically rich and diverse ecosystems in the world: the World Heritage National Parks of Iguazu (Argentina) and Iguacu (Brazil). The surrounding subtropical rainforest has over 2,000 species of vascular plants and is home to the typical wildlife of the region: tapirs, giant anteaters, howler monkeys, ocelots, jaguars and caymans. Located in the heart of these parks are the spectacular, cascading Iguazu Falls. Over 2,700 m across, they attract over 1 million tourists a year.

PROJECT The ecosystems surrounding these World Heritage National Parks are facing increasing pressures. Over the last twenty years agriculture has replaced subtropical rainforest. These dramatic changes could have an impact inside the World Heritage sites. Both the governments of Argentina and Brazil have successfully implemented conservation initiatives to protect the site but the current protected area might not be sufficient to maintain viable populations of 'umbrella species' including the jaguar, coati, and black lion tamarin, which need large areas in which to live.

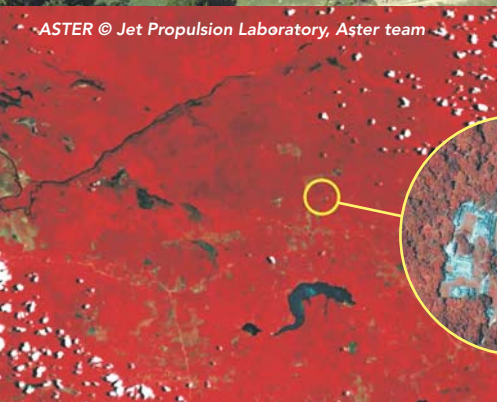
A joint project in collaboration with CONAE (Comision Nacional de Actividades Espaciales) is underway to assist Argentina and Brazil in their conservation efforts. Satellite images are being used to survey the surrounding areas of Iguazu and Iguacu National Parks. Analysis of these images will enable conservation authorities to examine possible ways of enlarging the protected areas. Updated and accurate cartography is being produced from satellite images to provide local conservation authorities with a cartographic and visual basis for monitoring wildlife-related data at these World Heritage sites.



PARTNERS

CONAE (Comision Nacional de Actividades Espaciales, Argentina), European Space Agency (ESA), Conservation authorities of Argentina and Brazil, Fundacion Vida Silvestre Argentina, World Wildlife Fund (WWF).

Using Earth Observation Data from Space to Develop a Decision Support System for Conservation



PARTNERS

National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory (JPL) and SERVIR, Conservation authorities of Guatemala.

LOCATION

The area covered by this project lies in the Northern part of Guatemala on the border with Mexico and includes extremely important archaeological sites such as El Mirador, Uaxactun, Tikal and Naranjo, which are astonishing vestiges of the Mayan civilization, containing superb temples and palaces in the lush heart of the jungle.

UNESCO in partnership with the conservation authorities of Guatemala and NASA is currently developing a decision support system for the whole region using satellite images. The final system will be a support tool for the conservation authorities of Guatemala.

Much of the archaeological evidence needed to understand Pre-Columbian societies in Central America comes from features of the landscape. Difficult terrain and logistics have limited collection of ground data. In order to support research needed to better understand archaeological topics and preserve biological and cultural diversity and resources in Central America, a NASA plane carrying NASA's AirSar, (Airborne Synthetic Aperture Radar) undertook to capture data from the rainforests of Central America.

AirSar's high-resolution sensors can penetrate clouds, collect data at night and, in a certain sense, 'see' beneath treetops (except dense forest). The data collected by AirSar will help shed insights into the way modern humans interact with their landscape, and how ancient peoples lived and what became of their civilizations.

AirSar data will also assist in better understanding forested ecosystems like those in Central America that cover less than 30 per cent of the Earth's land area, yet contain 90 per cent of all living species. Such areas serve as a large pool of terrestrial carbon, have substan-

tial interactions with the Earth's climate, and have been dramatically impacted by human activities. AirSar has collected data over sites for conservation scientists to measure the structure, biomass and carbon content of the forests, evaluate changes, and to support the development of models and methods to mitigate impacts.

SERVIR, a project from NASA and partners developed as a Regional Monitoring and Visualization System for Mesoamerica, intensively utilizes satellite imagery and other data sources for environmental management and disaster support. SERVIR is to be used by scientists, educators and policy makers to monitor and forecast ecological changes and to respond to disasters such as forest fires, tropical storms, floods, drought and volcanic eruptions.

UNESCO in partnership with the conservation authorities of Guatemala as well as with NASA, will make use of AirSar data and satellite images and will use the SERVIR infrastructure to derive an integrated system to assist the conservation authorities of Guatemala in their planning and managing of eco-archaeological protected areas as well as areas of forest concessions. The system should serve the conservation authorities in planning and monitoring the various land-use concessions, monitoring the surroundings of archaeological sites, and having a continuous update of how land cover is changing.

Machu Picchu

LOCATION

Machu Picchu is probably the most important urban creation of the Inca Empire. Built at its height, the property stands in a beautiful setting 2,430 m above sea-level, in the middle of Peru's tropical mountain forest. Its giant walls, terraces and ramps have the appearance of having been cut naturally into the solid rock escarpments. The natural setting, on the eastern slopes of the Andes, encompasses the upper Amazon basin with its rich diversity of flora and fauna. The success of Machu Picchu has made it a very popular destination and has brought a large number of visitors to the site. This popularity has complicated the monitoring and management of the property. The valley that provides access to Machu Picchu from the city of Cusco is also an area subject to eventual landslides.

T A joint project with the Government of Peru using space technologies and in particular remote sensing is underway to address these issues and provide the local conservation authorities with an effective management tool to better conserve the site in both its cultural and natural heritage values. Experts from Italy, Switzerland, Belgium and Japan as well as the European and Canadian space agencies

are supporting this effort, which includes mapping, assessment of land use and land use change, production of 3D models and contribution to a better understanding of the eventual landslides. This is done in close collaboration with other initiatives that UNESCO is undertaking under the leadership of the International Consortium of landslides.



PARTNERS

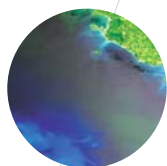
Main partner is the Government of Peru, Federal Technical School of Zurich (ETH Zurich), Instituto Nacional de la Cultura - Cusco, International Consortium of Landslides – University of Kyoto, Joint Research Centre (JRC), Politecnico Di Milano Technical University, University of Florence, University of Ghent, Jet Propulsion Laboratory (JPL).



PARTNERS

The *'Open Initiative on the Use of Space Technologies to Support the World Heritage Convention'*, is a framework permanently open to new partners that are willing to assist UNESCO in its endeavours.

UNESCO embraces an international network of innovative organizations, leading space corporations, space research institutions and talented individuals. These networks of partners are bringing to developing countries space technologies for the conservation of the world's cultural and natural heritage.





United Nations
Educational, Scientific and
Cultural Organization

Organisation
des Nations Unies
pour l'éducation,
la science et la culture

For more information contact:

- Natural Sciences Sector,
Division of Ecological and Earth Sciences
- Remote Sensing Unit
- 7, Place de Fontenoy
75352 Paris 07SP France
- Tel.: +33 (0)1 45 68 14 44
- Fax: +33 (0)1 45 68 55 70
- ma.hernandez@unesco.org
- www.unesco.org