

# Annual Work Report of HIST

(2022)

## I. GENERAL INFORMATION

**Name (and acronym) of the Centre:** International Centre on Space Technologies for Natural and Cultural Heritage (HIST)

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## II. MAJOR ACHIEVEMENTS AND ACTIVITIES

**Scope of activities**(Check all that apply)

- **Institutional capacity development**
- **Education & training**
- **Research**
- Advocacy, public outreach & awareness raising
- **Technical support and policy advice**
- Networks and partnerships development
- Production of data and statistical products
- Other-please specify below\_\_\_\_\_

**Contribution to UNESCO programme areas**

*Browse all the options in the drop-down list and select the most relevant three areas*

- **23. CLT World Heritage(1972 Convention and 2011 Recommendation)**
- **15. SC Biodiversity & climate change resilience**
- **16. UNESCO Global Networks(Biosphere Reserves, Geoparks, Transboundary sites)**

**Drop-down List:**

1. ED-Sector-wide policy and planning: right to education
2. ED-Technical and Vocational Education and Training(TVET)
3. ED-Lifelong learning and skills, including literacy
4. ED-Higher Education
5. ED-Teacher Development
6. ED-Education for Sustainable Development, global citizenship and health and well-being
7. ED-Gender equality in and through education
8. ED-Inclusion and education for vulnerable populations
9. ED-SDG 4 coordination

10. ED-Research and foresight
11. SC-Development & monitoring of inclusive STI policy & knowledge systems
12. SC-Dissemination & application of STI
13. SC-SIDS, indigenous peoples & local knowledge systems
14. SC-Management of geological resources & geohazards risk
- 15. SC-Biodiversity & climate change resilience**
- 16. SC-UNESCO Global Networks(Biosphere Reserves, Geoparks, Transboundary sites)**
17. SC-Water Security
18. SC-Water Governance
19. IOC-Sustainable use of oceans, seas and marine resources
20. SHS- Public-policy based on social and human sciences, ethics, and rights
21. SHS- Capacity-building based on social and human sciences, ethics, and rights
22. SHS- Youth for peaceful societies
23. SHS- Advocacy on inclusive, sustainable and peaceful societies
- 24. CLT-World Heritage(1972 Convention and 2011 Recommendation)**
25. CLT-Illicit Trafficking and Museums(1970 Convention and 2015 Recommendation)
26. CLT-Heritage and Armed Conflict(1954 Convention and its 1954 and 1999 Protocols)
27. CLT-Underwater Cultural Heritage(2001 Convention)
28. CLT-Culture in Emergencies(Conflict and Natural Disasters)
29. CLT- Living Heritage(2003 Convention)
30. CLT-Culture and Cultural Industries(2005 Convention and 1980 Recommendation)
31. CLT-Culture and Sustainable Development
32. CI- Freedom of expression & Safety of journalists
33. CI-Media and Diversity
34. CI-Media and communication development
35. CI-Information society and Access to information
36. CI-ICT for access to information
37. CI-Documentary heritage

### **Contribution to Agenda 2030**

*Select the most relevant SDGs to which the Institute or Centre work contributed(if possible no more than three), and explain how(not exceeding 200 words)*

#### **1. SDG 11**

Based on the global land cover datasets and high-resolution remote sensing images, the land cover changes were extracted at the World Natural and Cultural Heritage sites from 2010 to 2020, using the object-based image analysis (OBIA). The percentage of anthropogenic land cover change areas to the total protected area was calculated to quantitatively characterize change in heritage protection. The results reveal an internal relationship between the positive-negative change trend of the land cover in cultural heritage sites and the level of socioeconomic development, which in turn provide scientific data and technical approaches for the assessment of World Heritage protection and sustainable development. The change in land cover related to human activities is generally smaller than 5% at the boundary areas of World Natural Heritage sites, and attention should be paid to the interference caused by artificial facilities. The environments where World Cultural Heritage sites are located are generally well protected and the level of protection is highly correlated to the national socioeconomic development level. Analysis of 564 World Cultural Heritage sites shows that the change in land cover was less than 1% from 2015 to 2020 at the protected areas (heritage and buffer zones) of 90% of those sites.

## 2. SDG 13

HIST has carried out research on the process of wetland degradation under climate change in the Sanjiang Plain. Through the interpretation and analysis of long time series remote sensing images, it has clarified the succession of wetland vegetation and the substitution sequence of dominant plant populations, explained the change characteristics of environmental factors and human activities and their coupling relationship with wetland vegetation, analyzed the driving factors of wetland vegetation succession and predicted the future evolution trend of wetland. The research reveals that the Sanjiang Plain has experienced a large temperature fluctuation from 1960 to 2010, the temperature has been a linear rising trend, and the precipitation has been a linear decreasing trend. The rise of temperature in the Sanjiang Plain led to the rise of evaporation in the whole Sanjiang Plain, which was not conducive to the preservation of wetland water and promoted the transformation of wetland into meadow or other land types. Reduced precipitation leads to reduced surface water recharge, which is more detrimental to water conservation and speeds up the conversion of wetlands to other land types.

## 3. SDG 15

In 2022, HIST scientists use a globally consistent dataset that covers 18 years (2001–2018) of increasing forest habitat loss across Asian elephant range and examine the factors driving this loss. The conservation and sustainable management of pantropical forest habitats are of great significance to halt the loss of biodiversity and to protect threatened species from extinction. The protection and sustainable management of these habitats are also listed as an individual target (SDGs 15.5) of the United Nations's Sustainable Development Goals. HIST provide, for the very first time, an updated, high-resolution, and multi-temporal data set describing the recent forest loss in the Asian elephant habitat that constitutes a basis for habitat conservation and restoration and wild population recovery. It will also be of benefit to future sustainable management of the Asian elephant. At the same time, we call on conservationists and policy-makers to facilitate scientific and technological innovation related to the monitoring and conservation of the Asian elephant habitat, explore the use of management tools based on big satellite remote sensing data, and act swiftly to deal with intense human-elephant conflict.

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### Contribution to other international development agendas

*Select the most relevant global agendas to which the Institute or Centre work contributed (if possible no more than three), and explain how (not exceeding 200 words)*

- African Union Agenda 2063
- Addis-Abeba Action Agenda
- **Sendai Framework for Disaster Risk Reduction**
- Paris Agreement on Climate Change
- Small Island Developing States Accelerated Modalities of Action (SAMOA) Pathway
- UN Youth Strategy 2030
- Other (Please specify below)\_\_\_\_\_

### Sendai Framework for Disaster Risk Reduction

How/Comment:

After the Jiuzhaigou Ms7.0 earthquake in 2017, HIST was entrusted by the Jiuzhaigou World Heritage Administration to carry out space-based integrated monitoring and assessment for post seismic recovery and protection of heritage sites. Through the comparison and analysis of multi-temporal monitoring results of large landslides around Heyezhai, Shuzhengzhai, Wuhuahai, Pandahai and Jianzhuhai from the earthquake in 2017 to 2022, it is found that the area of these landslides reached its peak in 2020. Afterwards, these large landslides were

treated by engineering, and it has been observed that pioneer plants have developed and grown at the bottom of the landslide. The restored landslide areas are mainly concentrated in the gentle slope area. After the Jiuzhaigou earthquake, the landslide and collapse activity pattern gradually changed to the direction in which the landslide recovery trend was dominant. However, due to the restored vegetation community structure on the slope, the ability to resist extreme factors is weak, and the blocking effect on avalanche materials is limited. Thus, the landslide and collapse disasters are easily reactivated, and the restored slope still needs to be continuously monitored and protected.

## Major achievements

*Major outcomes, results and impact of the Institute or Centre activity of the year, in relation to the objectives stated in the Agreement (Not exceeding 200 words)*

First, HIST signed MoUs with IUCN, ICCROM and ICOMOS to shape long-term strategic partnerships on the use of space technologies for the protection of World Heritage sites and will jointly conduct conservation activities in the next five years. Second, it has monitored and evaluated land-cover change for the sustainable development of World Heritage properties, habitat suitability of Asian elephants, the recovery of Jiuzhaigou from earthquake, earthquake-induced deformation of Heraklion City Walls. Third, nine students completed their PhD and MSc and another twenty candidates were pursuing their degrees at HIST. A training workshop was organized to enhance technical capacities of 89 site managers. Fourth, it published one book-*Introduction to LiDAR Remote Sensing* and over 30 papers. It also collaborated with *International Journal of Applied Earth Observation and Geoinformation* to publish a special issue on Earth Observation for Heritage Documentation to celebrate 50th Anniversary of the *World Heritage Convention*. Fifth, HIST partnered with International Center of Big Data for Sustainable Development Goals(CBAS) to launch Sustainable Development Science Satellite 1 (SDGSAT-1) and utilize SDGSAT-1 for archaeological discovery, heritage conservation and disaster reduction. Sixth, more than five seminars were held to strengthen academic communication and promote the application of space technologies.

## Gender equality

*Explain how gender equality considerations were integrated or featured in the Institute or Centre work (Not exceeding 200 words)*

HIST has long been committed to respecting gender equality and created a gender-friendly work environment. First, HIST's staff members, regardless of gender, enjoy equal voting rights, freedom of speech and belief, and receive equal remuneration for work of equal value. Second, men and women have equal access to high-quality education and trainings at HIST. Third, equal opportunities are offered to men and women in HIST's project application and implementation. Fourth, male and female staffs at HIST are eligible for medical, maternity and paternity leaves as well as all kinds of public holidays. Facial masks and other materials against the spread of the pandemic are equally distributed to men and women at HIST. Fifth, female and male participants are equally encouraged to participate in HIST's events. Sixth, the sex ratio of HIST's staff members is closer to 1:1. At HIST secretariat, this ratio is 3:2. Seventh, there is no discrimination and violence against women at HIST. Eighth, equal participation of male and female journalists is encouraged to cover HIST's activities. To sum up, HIST promotes gender equality in various ways and builds a sustainable future for both women and men.

## Beneficiaries of activities

1-Activity	2-Type of Beneficiary	3-Country	4-Number of beneficiaries	5-Percentage of women	6- Percentage of young
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International Symposium on the Protection and Restoration of Wetland Ecosystem Functions in Cold Regions during COP 14	Government officials, site managers, researchers, technicians, students	China, Russia, UK, USA	180	49	33
Online Courses “Space Technologies safeguards World Heritage Sites”	Government officials, site managers, researchers, technicians, students	China	72000	57	55
2nd “Beautiful China Middle Ridge Belt” Sustainable Development Forum	Government officials, site managers, researchers, technicians, students	China	105143	46	35
Training Workshop on Space Technologies in monitoring and conservation of UNESCO-designated Sites	Site managers, researchers, technicians, students	China	89	54	45

- 1- Activity: Organized/supported by the Centre (examples “Training”, “Workshop”, “Symposium”, etc.)
- 2- Type of beneficiary: Examples “Government officials”, “Students”, “Farmers”, etc.
- 3- Country(ies): country of origin of the beneficiaries; not necessarily the country of the event; if list, separated by commas (example “Country 1, Country 2, Country 3”)
- 4- Number of beneficiaries: Indicative total number of beneficiaries in each category
- 5- Percentage of women: Indicative percentage of women
- 6- Percentage of young people: Indicative percentage of young women and men (15-24 years)

If it is not possible to indicate the beneficiaries by activity, then ignore the first column and provide information on total number of beneficiaries and on all other categories in columns 2 to 6.

### **Institutional partners**

Indicate the name of the main institutional partners and the role played by each one (Not exceeding 200 words)

Partner	Role
International Union for Conservation of Nature	Cooperated with HIST on developing spatial data on natural World Heritage sites
Harokopio University of Athens	Jointly conducted the monitoring of Badaling section of the Great Wall and Acropolis
Jiuzhaigou World Heritage Administration	Jointly conducted space-air-ground integrated monitoring and evaluation of Jiuzhaigou World Heritage Site
International Council on Monuments and Sites International Conservation	Jointly conducted the monitoring and evaluations of World Cultural Heritage properties in Xi'an, which are part of Silk Roads: The Routes Network of Chang'an-Tian Shan Corridor

Center-Xi'an (IICC-X)	
Huanglong World Heritage Administration	Jointly conducted remote sensing monitoring and evaluation of Huanglong World Heritage Site

### **Collaboration(s) with UNESCO network/partners**

*List of UNESCO partners/networks (UNESCO Field Offices, Category 1 institutes/centres, National Commissions for UNESCO, UNESCO Chairs, Associated schools, other Category 2 institutes/centres) with which the Institute or Centre worked during the year and on what (Not exceeding 200 words)*

Collaboration with (name of institution)	Activity/Project
World Heritage Institute of Training and Research for the Asia and Pacific Region(WHTRAP)	HIST was invited to make a speech at WHTRAP World Heritage Dialogue on the next 50: World Heritage as a source of resilience, humanity and innovation.
UNESCO Chair on Sustainable Tourism in UNESCO Designated Sites	HIST was invited to make a speech at the first World Cultural and Natural Heritage Forum hosted by UNESCO Chair on Sustainable Tourism in UNESCO Designated Sites and other institutions.

## **III.BUDGET**

### **Financial resources**

*Financial resources received during the year (in US dollars) dedicated to programme implementation (not operational costs)*

Source (name of Institution)	Amount Received
Chinese Academy of Sciences	700,000
Ministry of Industry and Information Technology, PRC	150,000
International Center of Big Data for Sustainable Development Goals	150,000
Ministry of Science and Technology, PRC	50,000

## **IV. MAIN CHALLENGES, LESSONS LEARNED AND FUTURE PLANS**

### **Main challenges**

*List of main challenges faced in implementation of activities and how they were addressed (Not exceeding 200 words)*

The impact of the pandemic COVID-19 and the gap between more demand for space technology application and less fund remain major challenges for HIST. First, HIST's conservation projects are not effectively conducted due to the pandemic. For example, HIST can monitor and analyze land cover changes in environmental conditions along the Chang'an-Tianshan Corridor, but the pandemic makes field missions of HIST's scientists to those sites more difficult. However, HIST continues to explore and conduct international cooperation via web-based platforms such as Microsoft Teams. Second, the increasing demands for the monitoring of natural and human-induced risks of UNESCO-designated sites by the utilization of space technology, but some heritage sites need more funds to meet their rising demands to promote sustainable development. However, HIST mobilizes its own resources to conduct pilot projects in some sites, and hopes that relevant government, foundations and other stakeholders will offer more funds to support heritage conservation projects.

### **Lessons learned** *(Not exceeding 200 words)*

HIST will make more efforts to win financial resources from international foundations, enterprises and other stakeholders to conduct international research and expand its global influence to make space technologies benefit more UNESCO Member States.

## **Plans and/or prospects**

*Future plans and/or development prospects of the Institute/Centre (Not exceeding 200 words)*

In 2023, HIST will concentrate on the utilization of space technologies to conduct research projects, enhance knowledge and skills of UNESCO-designated sites, strengthen international academic communications, and host international conferences to contribute to sustainable development of heritage sites in line with the *World Heritage Convention* and other relevant international landmark agreements. First, HIST will conduct cooperation with UNESCO World Heritage Centre, IUCN, ICOMOS and ICCROM on the nomination, monitoring and evaluation of World Heritage sites. Second, HIST will further promote the cutting-edge multidisciplinary development of space archaeology by theoretical research, methodology designing and cultural applications. Third, HIST will organize a training workshop to strengthen capacities of World Heritage sites in developing countries and Huangshan Dialogue on UNESCO-designated Sites and Sustainable Development to advance sustainable development of UNESCO-designated sites. Fourth, HIST will work with International Center of Big Data for Sustainable Development Goals to expand global application of SDGSAT-1 for the conservation of UNESCO-designated sites and share heritage satellite data with UNESCO World Heritage Centre, Ecological and Earth Sciences Division and relevant UNESCO Member States.

## **V. OTHER INFORMATION DOCUMENTS**

### **Other relevant information**

*Additional information or comments not provided above (Not exceeding 200 words)*

HIST has successfully invited senior representatives from UNESCO, IUCN, ICOMOS, Chinese State Administration of Cultural Heritage, Chinese State Administration of Forestry and Grassland to serve on its new Governing Board, will complete the reconstitution process in the first half of 2023 and convene the tenth session of HIST Governing Board in 2023. Meanwhile, it has discussed with UNESCO World Heritage Centre potential collaboration on routine and emergency monitoring and assessment of World Natural Heritage sites and capacity building activities, and plan to engage IUCN and ICCROM to make concerted actions to implement three major collaborative activities, and exchanged views with UNESCO MAB Secretariat to utilize space technologies for the conservation of biosphere reserves.