National Cartographic Center of Iran

Economic Cooperation Organization

ECONOMIC COOPERATION ORAGANIZATION

(ECO)

TRAINING COURSE

The National Cartographic Center of Iran with the support of ECO Secretariat holds a training course on:

Application of Geospatial Data in Disaster Risk Reduction

09-10 December 2024

The History of National Cartographic Center of Iran (NCC)

During the Qajar era and by the efforts of Abbas Mirza, the son and crown prince of Fath-Ali Shah, some individuals were dispatched to Europe to learn new knowledge. At the time of the chancellorship of Mirza Taghikhan Amirkabir, the famous Chancellor of the Qajar era, the new School, Dar-ul Funun was established to expand and utilize the new sciences and technologies.

In this newly established school, the Austrian professors accompanied by Iranian graduates from Europe were teaching. One of the subjects taught at Dar-ul Funun was surveying. The surveying students of Dar-ul Funun, who some of them started teaching at that center thereafter, had been preparing some maps of the villages around Tehran parallel to their education.

Graduates such as the late Abdorazaq Baqayeri have provided outstanding services in foundation of surveying and mapping, especially in determination of the boundaries of the country.

As surveying is the prerequisite for constructional, defense, development and planning measures; due to familiarity with the application of surveying, some units were gradually established in military departments as well as in ministries and other organizations, which required surveying and mapping services to meet their case requirements. These units sporadically prepared some maps by land surveying method. After the establishment of Tehran University, some faculties such as the Technical Faculty, the Faculty of Agriculture, the Faculty of Science and … included the course of surveying in their curricula.

During the first seven-year development program (1948-1955), an office named "Engineering Agency" was established in the Planning Organization of the time which surveying was also a part of its activities.

From 1951, foreign consultant engineers attended in the country for consultation and implementation of different projects. They received heavy charges for the cost of surveying operations.

During these years, a group of experts of the Planning Organization (including Engineer Hami, Engineer Khanbaba Iravani and ... cooperating with Colonel Notash) came to the idea of establishment of an organization with the ability to meet all the surveying and mapping demands throughout country.

On 27 May 1953, to prepare the overall map of the country and conform all surveying

operations done by all government bodies and institutions throughout the country, the government of the time, enacted the law of establishment of National Cartographic Center affiliated to the Planning Organization of the time.

After the decision, the late Engineer Ebrahimi, who had completed his postgraduate studies in photogrammetry in the Netherlands, was given the mission to establish National Cartographic Center.

After the preliminary arrangements, he was appointed as the first Director General of National Cartographic Center.

This newly established organization initially started by recruiting some surveyors from other organizations as well as by providing tools and equipment, and then to provide the groundwork to achieve the up-to-date surveying technology which was common in developed countries of that time through aerial photography and aerial photo restitution, it made measures to hold educational courses for training work force.

In these classes, local and foreign professors were teaching and many trainees managed to pass during its four held courses. Later, by the support of the United Nations and the scholarships awarded by other countries as well as the finance from NCC, some of these graduates were dispatched to educational centers of developed countries to study higher education and gain experience.

It is necessary to mention that in 1965, after several years of training recess, the High School of Surveying was established by obtaining the necessary licenses from the higher education authorities of the country. This center continued its activities up to the victory of the Islamic Revolution.

By the establishment of National Cartographic Center and utilization of modern technologies based on the aforementioned trainings and equipping it with advanced facilities such as aircrafts, photogrammetry instruments, printing tools, distance meters, surveying cameras, cartographic equipment, etc. effective steps were taken in implementing of construction plans.

NCC has always played an important role in all construction plans of the country such as urbanization, dam construction, irrigation, road construction, electric power transmission, mining and preparation of cadastral maps by surveying, aerial photography and preparing different maps.

During the Holy Defense, NCC provided valuable services for preparing borderline maps. Preparation of maps at the scale of 1:10,000 of Abadan (Faw to Chazaba) can be mentioned during this period as an example.

In the construction period after the holy defense, National Cartographic Center also initiated to perform extensive activities including workforce training, purchase of equipment, planning of various projects and plans including the preparation of national coverage maps of 1:25000 scale and national Atlases, completion of base networks, preparation of marine charts, preparation of digital maps of different cities of the country at the scale of 1:2000, establishment of national spatial database, preparation and publication of various thematic maps of the country.

Over more than five decades of being active, NCC has proved its role as the main leader of map production and spatial information in the country.

By expansion of the domain of users and applications of maps and spatial information in the last decade, NCC has also been successful in introducing spatial information as one of the key elements for planning, management and knowledge-based development in the direction of twenty-year development vision and five-year development plans of the country.

By continuing the present routine of producing different map and spatial information services by public and private sectors and establishment of different databases with various applications in the country in the coming years and considering the offered services and activities of NCC, the aim is to better enable this organization in interacting with its wide range of users and clients in offering optimum services.

At present, through using maps and spatial information provided by National Cartographic Center, different databases with numerous applications have been established in the country and concerning the offered activities and services, NCC supports a wide range of users and clients while providing the bases for the government supporting role in advocating the private sector in surveying activities.

Investigations show that the position and potential of the Islamic Republic of Iran in map and spatial information production is prominent comparing to other developing and developed countries. To prove the claim, the production and update of 9000 sheets of the coverage maps of the country at the scale of 1: 25000 and production of digital maps of most of the cities of the country at the scale of 1: 2000, can be mentioned.

NCC also undertakes the chairmanship of the Iranian National Committee on the Standardization of Geographical Names which its task is to coordinate and standardize the nomenclature of different places of the country.

Complete establishment of National Basic Location Information System and National Spatial Database Infrastructure (NSDI) are of other missions of NCC as the policy maker which enhances its role from being a mere spatial information producer to a

coordinating and supervising organization that provides the necessary infrastructure for standardization of spatial information throughout the country and also the bases for sharing and exchange of spatial information in a national level.

Monitoring of land geometrical changes such as changes in elevation, gravity and surface which are of prominent importance in natural hazards management in plain subsidence and earthquake-prone areas, are also of the main tasks of NCC.

NCC is legally affiliated to the Plan and Budget Organization of the country and its governing tasks are imparted by this organization, hence the role of NCC in supporting the activities of other ministries such as Ministry of Road and Urbanization, Ministry of Power, Ministry of Interior and Ministry of Agriculture is also considerable.

I. Background

Natural disasters and climatic changes have many destructive effects on the economy, environment and society of the countries of the world. Many elements and components of natural disasters and hazards dependent on location information and geospatial data has a main role in reducing damage to national infrastructures and treasures and all individuals, preventing disruption in the continuity of current activities, including daily life, economy, production and trade in the country's villages and cities, as well as to save people's lives.

Geographical data can provide the necessary information, comprehensive and scientific knowledge for institutions and bodies that directly and operationally have an executive role in crises and disasters to control and reduce the vulnerability of the country in disasters and crises.

For this purpose, after years of activity in the field of monitoring changes in the earth's crust in Iran and providing regular and periodic reports to the relevant custodians and crisis management officials of the country, NCC formed a “Crisis Management Committee” to pursue the following general goals in the field of crisis management and risk reduction:

Playing an effective role in the comprehensive management and control of disasters and risks in the country, by developing application systems under the National Spatial Data Infrastructure (NSDI)

1- Preparation and presentation of infrastructural/thematic maps to reduce the effects of hazards caused by accidents and disasters using the Geospatial Information System (GIS)
2- Providing data, information and services necessary to make informed decisions in preparation and response to the impact of disasters and risks in all phases of crisis management
3- To improve the necessary scientific skills and techniques, as well as the organization's potential in confronting the country's environmental risks and vulnerabilities, to support risk reduction and to increase the country's resilience in the face of risks and disasters
4- Cooperation with the country's Crisis Management organization and other organizations and executive bodies in the development of Early Warning Systems and interaction in other related systems
5- Increasing resilience and reducing vulnerability to crises and natural hazards

2. About the Virtual Capacity Building Training Course

This Virtual Capacity Building Training Course will be organized by the National Cartographic Center of the Islamic Republic of Iran with the support of the Economic Cooperation Organization (ECO). It will be a two-day Training Course. The program is studies, and will be informed with the official tasks of the National Cartographic Center designed to raise and improve awareness, knowledge, and understanding of application of geospatial data in disaster risk reduction. In this training course, the participants would learn the important aspects of geospatial data in natural disaster monitoring and, damage and loss estimation through lectures and demonstrations. During the Training Course, participants would have a better and real understanding of the main aspects of application of InSAR and remote sensing techniques and GNSS data for disaster risk management and climate changes detection of Iran in this field.

The Training Course consists of four different parts:

1- Applying Earth Surface Deformation Field Acquired from InSAR for Geo Hazard Studying

- **Topics of Day1 of Session 1: InSAR principle:**
    - SAR images
    - SAR geometry
    - SAR resolution
    - Phase and amplitude
    - InSAR techniques
    - Deformation map generation procedure
- **Applications**:
    - Subsidence
    - Earthquake
    - Landslides
    - Soil erosion

- **Topics of Day1 of Session 2: GNSS Data Analysis to Monitor Plate Tectonic Movements:**
    - Plate Tectonic and Earthquake cycle
    - Active Tectonic and Space Geodesy
    - Data Collection-Processing-Analysis
    - Application in Disaster Management

Topics of Day 2 Session 3: The Role of Remote Sensing in Disaster Management

- **Introduction**
    - Types of Disasters - Natural and Human-Caused
    - Disaster Management Cycle
- **Geospatial Technology and Disaster Management**
    - Role of Remote Sensing in Disaster Management Cycle
    - Aerial and Satellite Remote Sensing Applications in Most Common Disaster Types
- **Activities of National Cartographic Center of Iran on Various Disasters**
    - Sand and Dust Storm
    - Air Pollution
    - Flood

Topics of Day 2 Session 4: The role of geospatial information sciences in climate change

- What is climate change?
- What are the effects of climate change?
- What is the IPCC and what does it do?
- Remote sensing and aerial images as tools for climate change monitoring
- Geospatial information system for change detection and risk assessment
- Hydrography for sea level height measurements
- Cartography as illustration and presentation of information related to climate change

II. Relevance of this Training Course to the ECO Region

The upcoming educational Training Course on geospatial data in disaster risk reduction in Iran Envisioning a Bright Future holds great relevance for the ECO region, as it addresses the crucial need for efficient management and utilization of geospatial data in the region. Countries in the ECO region can address common issues such as climate change, natural disasters, urban planning, agriculture, and water resource management. Natural disasters and climatic changes have many destructive effects on the economy, environment and society of the countries of the world. Many elements and components of natural disasters and hazards dependent on location information and geospatial data has a main role in reducing damage to national infrastructures and treasures and all individuals, preventing disruption in the continuity of current activities, including daily life, economy, production and trade in the country's villages and cities, as well as to save people's lives. Geographical data can provide the necessary information, comprehensive and scientific knowledge for institutions and bodies that directly and operationally have an executive role in crises and disasters to control and reduce the vulnerability of the country in disasters and crises. Overall, this workshop serves as a platform for stakeholders in the ECO region to strengthen their capacity in geospatial data in disaster risk reduction, enhance their technical skills, and explore innovative solutions to common challenges.

III. Participants

The Virtual Capacity Building Training Course is open to interested participants, but prior registration is required for all interested participants. The Registration Link is https://www.skyroom.online/ch/ncc.gov/eco.
Participants are expected to be Geomatics professionals of ECO Member States with minimum knowledge of geodesy and new technologies in geoscience and whoever is interested in Geomatics sciences. Also, will be given certificate to participants.

IV. Provisional Annotated Agenda

The provisional annotated agenda for the Virtual Capacity Building Workshop is as follows:

Program of Training Course	
Day 1: December 09, 2024 *09:00 – 10:00 hrs.* *(UTC+3:30, IRAN time)*	▪ Welcome address by Dr. Javidaneh from NCC ▪ Welcome address by Dr. Saadat from NCC ▪ Welcome address by ECO Geomatics Secretary ▪ Address by ECO Secretariat
Day 1: December 09, 2024	**Instructor: Dr. M. AmighPey& Dr. H. Nankali**
Session 1: *10:00-11:50* *(UTC+3:30, IRAN time)*	**InSAR principle:** ▪ SAR images ▪ SAR geometry ▪ SAR resolution ▪ Phase and amplitude ▪ InSAR techniques ▪ Deformation map generation procedure **Applications:** ▪ Subsidence ▪ Earthquake ▪ Landslides ▪ Soil erosion
Session 1: *11:50-12* *(UTC+3:30, IRAN time)*	**Question & Answer**

Session 2: *13:00-13:50* *(UTC+3:30, IRAN time)*	▪ Plate Tectonic and Earthquake cycle ▪ Active Tectonic and Space Geodesy ▪ Data Collection-Processing-Analysis ▪ Application in Disaster Management
Session 2: *13:50-14* *(UTC+3:30, IRAN time)*	**Question & Answer**

Program of Training Course	
Day 2: December 10, 2024 *10:00 – 10:15 hrs.* *(UTC+3:30, IRAN time)*	▪ Introduction to Day 2 Sessions by Dr. Saadat
Day 2: December 09, 2024	**Instructor: Dr. M. Omati& Dr. R. Papi**
Session 1: *10:15-11:50* *(UTC+3:30, IRAN time)*	**Introduction** ▪ Types of Disasters - Natural and Human-Caused ▪ Disaster Management Cycle ▪ Geospatial Technology and Disaster Management ▪ Role of Remote Sensing in Disaster Management Cycle ▪ Aerial and Satellite Remote Sensing Applications in Most Common Disaster Types **Activities of National Cartographic Center of Iran on Various Disasters** ▪ Sand and Dust Storm ▪ Air Pollution ▪ Flood
Session 1: *11:50-12:00* *(UTC+3:30, IRAN time)*	**Question & Answer**
Session 2: *13:00-14:50* *(UTC+3:30, IRAN time)*	▪ What is climate change? ▪ What are the effects of climate change? ▪ What is the IPCC and what does it do? ▪ Remote sensing and aerial images as tools for climate change monitoring

	▪ Geospatial information system for change detection and risk assessment ▪ Hydrography for sea level height measurements ▪ Cartography as illustration and presentation of information related to climate change
Session 2: *14:50-15:00* *(UTC+3:30, IRAN time)*	**Question & Answer**

V. Organizers

National Cartographic Center (http://ncc.gov.ir/) will organize the Training Course with the collaboration of the Secretariat of ECO (http://eco.int/).

VI.	**Point of Contact**
Dr. Ali Soltanopur Secretary of ECO Geomatics Committee *Tel (Office): +98-21-66071144* *(Cell phone): +98-912-3161022* *E-mail: asoltanpour@yahoo.com*	**Ms. Maryam Sadeghi** Head of International Cooperation Office *Tel (Office): +98-21-66071113* *Tel (Cell phone): +98-912-6494329* *E-mail: Maryam1355sadeghi@gmail.com*
Mr. Husnu Tekin Director of Human Resource and Sustainable Development at ECO Secretariat *Email: tekin@eco.int* *Whatsapp No. +90 533 229 38 72*	**Ms. Neda Moshref Javadi** Program Officer, Human Resources Sustainable Development, Tehran *Email: javadi@eco.int,* *Whatsapp No. +98 9125153002*