Excellencies

It gives me great pleasure to attend the inauguration of the workshop on "The Use of Space Technology for Environmental Security, Disasters Rehabilitation and Sustainable Development", at which, are present, renowned global experts, specialized in the field.

No doubt, fresh water can be defined as the sole and rare element playing an essential role in the construction of human civilizations. This element can be measured, controlled and operated in three distinct layers:

-UItrasphere (atmospheric intermediary or aerosphere

layer);

- Biosphere (rivers, plains and mountains);and

- Intersphere or underground layer (groundwater). Nowadays, the development of new technologies in the field of water studies, including modern measurement techniques, control methods, etc, have overshadowed traditional techniques and devices applied in this respect. Although the recognition of such techniques dates back to a century ago, their application has not been practiced until very recently. Water resources use and operation in the above

spheres is possible in inherent structures and via the application of operational management methods, requiring hard work and carried out through various stages.

Recent years have been the witness of development and enhancement of various fields of sciences related to water resources and underground waters.

The importance of such activities are not only revealed at the national, but also at the international level. In this respect, some 45,000 large dams and more than 100,000 of other small hydraulic structures are constructed and millions of deep or semi deep wells have been excavated for better access and use.

I would like to mention, here, that Iran has a good experience in the fields of construction, management and other activities related to water resources.

I would like to refer to the ancient flood control structures and unexpected water operations (reservoir dams, bund walls, renovation of river banks, diversion dams, water supply channels and water transmission tunnels) that were in access in Iran and some are still in use.

Qanat, can, also, be recognized as an ancient underground structure solely available in Iran. Until lately an

approximate number of 30,000 Qanats were in access, which were put to various use. As an example we have the barraged underground galleries constructed in various appropriate locations.

From the past, specific regulations have been put to practice in installation operations namely water management participation. Therefore, as a principle of sustainable development, one could refer to local governance practiced in Qanat systems. Due to its technical background, importance and the large number of Qanats it possesses, Iran, has the honor to setup the " International Research Center for Qanat with the assistance of UNESCO, in the near future. Application of integrated water management methods at the national level such as that applied in rivers, water supplies, and urban potable water resources, also sanitation methods applied and water transmission from other districts are all examples of national governance, rooted in past centuries. Recently, the government of Iran has set a number of long-term development strategies for Iran's water resources, the topics of which are:

1) Macro management

2) Water resources management

3) Consumption management

4) Economic value
5) Quality control

6) Water supply costs

7) Water exchange

8) Land use planning

9) Interbasin water transfer
10) Management and structure

11) Watershed / basin composition

12) Risk management

13) Urban water distribution
14) Public training

15) Shared waters
16) Information management

17) Preservation of historic hydraulic structures

18) Intersectoral management

Water Resources, Problems and Status

By implementing 5 national development plans, 80 large dams, 65 of them after the Islamic Revolution, have been constructed with the total capacity of 27 bcm which could

control and regulate 33 billion cubic meters of renewable (surface water, annually.

Groundwater exploitation and the use of new excavation technologies, have a great influence on Qanats and their importance and have had them replaced with deep and semi deep wells. As a result one could refer to the creation of some 500,000 of deep and shallow wells and approximately the same amount of hand excavated open wells, with the total capacity of 59 bcm. However, uncontrolled excavation of wells, in addition to inappropriate utilization of existing wells have altogether led to water depletion. Lack of sufficient recharged groundwater has caused serious damages to national water resources and effected them to a large extent. As an example of which one can refer to serious draw downs of the water level, decreasing well discharges, acidification, water intrusion and even worse, land erosion caused by the over exploitation of aquifers, in many regions.

To combat drought and overcome water shortage, it is necessary to act against and prevent water pollution. From a quantitative point of view, the total utilization of ground and surface waters are about 92 bcm from which an amount of 94 percents equal to 85 bcm of water is used in agriculture

and some 7 bcm is used for drinking and industrial purpose: At present, more than 96 percents of urban areas hay access to safe water supply systems.

Population increase and cultivation decrease leads to the shortage of water supplies required for food production. These are examples of challenges our water supplies will b confronted with in the future.

In this respect, the following preventive methods an recommended:

- Consumption pattern change

-Renovation and rehabilitation of urban water supply~ networks

- Recycling and treatment of waste and used water

- Utilizing non-conventional water

- Prevention of water resources pollution - Aquifer depletion prevention - Increasing infiltration rate

- Artificial groundwater recharges operation

- Water delivery from distant resources to drought effected areas

- Treatment of water supplies in critical condition

Although there is a little precedence regarding utilization of space sciences in land recognition through aerospace and like technologies, ever since the advent of such technologies, IRAN, too, has joined the select group of such activists and with the installation and start-up of a satellite center in Karaj (near Tehran) it has initiated activities in this field; yet the actual experience and extended use of these technologies especially on the technical side, dates back to less than a few decades ago.

Using aerospace imaging methods with a high level of magnification and resolution for identifying natural features, preparing land use maps and recognition of surface waters has evolved gradually over the past decade as a result of advancements achieved in the construction of more precise satellites (e.g. LANDSAT, NOAA, etc), which provide the grounds for identifying sub-surface layers as well. The importance of applying such methods, bearing in mind the increasing interest in the topic of water resources, especially after the Rio summit and the last Johannesburg meeting, is manifested both at the national and international levels, as a result of which Iran has put the application of these technologies in its schedule.

One of the critical concerns of Iran is the evaporation and acute transpiration of surface water under solar radiation (land, water, or vegetations).

Our friends in the meteorology department would explain the hydrological factors contributed to this phenomenon, but from the point of view of water resources, this amount of surface water evaporation causes deterioration in the quality and quantity of lake waters and soil, and also effects the flow of water on superficial layers of land with salt deposits. This heat and evaporation has resulted in the creation of our central plains, and has our annual vegetation turn thorny under the intense solar radiation of Iran. This shows a reduction of evaporation level from leaves and restoration of ecological balance. But for other surfaces including soil and water, such a natural solution does not exist. Therefore a way must be found to reduce the impact of evaporation from surfaces of natural waters, such as ponds and man-made lakes, fertile soils and rangelands.

This phenomenon is more or less similar in countries located in an identical geographical latitude as that of Iran, so a study of changes resulting from solar radiation on soil,

vegetation and water surface by applying state-of-the art techniques could be a suitable subject for research.

Additionally, this level of evaporation has a great impact on estimates for water requirement of vegetation and other uses of water. The Ministry of Energy in cooperation with the Remote Sensing Center has executed the project for Isothermal study of the Caspian Sea surface. Financed by public credits, this project started in 1379 (2000) and was completed by 1381 (2002) and an analytical report has been prepared on it. The results of these researches could be useful in later studies, including identification of changes in the volume and level of the Caspian Sea water, the amount of its evaporation, water movement and in the study of diminishing inlets or increasing marshlands and deteriorating port facilities and harbors in the Northern parts of the Caspian Sea. In addition, identification of locals for congregation of fish and other water creatures, and short term (six month) meteorological forecast also becomes possible.

"Drafting a map of snow ranges" using satellite data for carrying out research on the water outflow of various regions, flood and drought controls and a decrease in damages caused by floods, are among other project in progress of the Ministry

of Energy in which the data from remote-sensing and progressive over flights of NOAA and Terra satellite, capable of transmitting daily pictures, are collected and plotted.