United Nations/UNESCO/Saudi Arabia

1st International Conference on the Use of Space Technology for Water Management

Hosted by King Abdulaziz City for Science and Technology (KACST), and the Prince Sultan bin Abdulaziz International Prize for Water (PSIPW)

12-16 April 2008

Working Groups' Discussion Session
– Summary –

I. Introduction:

The Working Group (WG) discussion session was held on 16 April 2008, between 08:00 and 12:00. Coordinators of the WG's were Sergei Chernikov and Alice Lee of UN-OOSA. The objectives of the Working Group discussion were as follows:

- To discuss issues and concerns in each thematic area
- To discuss potential solutions using space technologies
- To develop the observations and recommendations of the Conference
- To develop project ideas for follow-up actions

The ground rules that guided the discussion to initiate projects or to set forth actions were as follows:

- The theme of the conference must be respected
- All issues under discussion must be looked into
- Work is to be conducted in a spirit of cooperation between working groups
- Regional or global projects are to be selected
- Teams are to be formed from the regional or global partnership. If costing or data is needed, then the project's leader has to determine with the team members how they can get support. This could be voluntary work that synchronizes with existing duty work.
- Coordination of a project or action could be on three levels:

    - the national level, where each country:
        - performs it own detailed work
        - defines its own national team
        - defines its own thematic application, scope, product & schedule of project(s)

    - the regional level:
        - data and technical sharing, information exchange

    - the global level:
        - UN OOSA provides advisory services as needed and monitors the progress. [Lead: Sergei Chernikov]

Three Working Groups were established as follows:

1. WG 1 - Integrated Land and Water Resources Management Using Space Inputs
    - Chair: Huskur Honne Gowda, INdia (hg_huskur@yahoo.co.in)
    - Rapporteur: Sanaullah S. Sayed, Pakistan
    - Members: see annex 1

2. WG 2 - Application of Space Technology and Data
    - Chair: K. Dabrowska-Zielinska (kasia@igik.edu.pl)
    - Rapporteur: Manzoor A. Malik
    - Members: see annex 1

3. WG 3 - Capacity Building, Data Policy, international, Regional, and National Cooperation

- Chair: Mohamed Tarabzoni/Jarrah Al-Zu'BI (jarzubi@hotmail.com,
- Rapporteur: Julie LADEL
- Members: see annex 1

II. Working Groups Discussion Summary

A. WG 1 - Integrated Land and Water Resources Management Using Space Inputs

1. Title of proposal

"Integrated Land and Water Resources Management in Arid or Semi-Arid Region Using Space Inputs : A Pilot Study"

2. Background

A growing number of countries, particularly in tropical belt, are facing challenges due to increased pressure on land for food, fuel, fibre and fodder, as well as on account of industrial expansion and the consequent need for infrastructural facilities to meet the requirements of an ever increasing population. All of this has given rise to competing and conflicting demands on finite land and water resources. Integrated land and water resources management through appropriate exploitation and adoption of frontier technologies – such as space technology, GIS and other enabled technologies in conjunction with agri-biotechnology and advanced irrigation & water harvesting technological innovations – is expected to improve land and water resources management in a cost effective and sustainable way.

A watershed is a convenient and clearly defined topographical unit, which is being considered as a basic erosional landscape element for effective management of land and water resources. Satellite remote sensing, by virtue of its capability to provide synoptic views of large areas on a repetitive basis, has become an effective tool for watershed management. The potential of remote sensing technology to address various issues related to the development of watersheds on a sustainable basis, is well established. It has been used for resource surveys and mapping, watershed characterization, water balance studies, run-off estimation, sediment yield assessment, watershed prioritization, action plans for improved water and agriculture development, monitoring and evaluation. Information derived from satellite data are integrated with data from other sources in a GIS domain to evolve a suitable action plan for land and water resources development. Implementation of the action plan at a cadastre level will be taken up by adopting suitable strategies and technologies in order to achieve the best agricultural practices and water harvesting practices in tune with ecological considerations. The proposed study will address the following issues:

- drought
- soil erosion
- environmental degradation
- wasteland
- deforestation
- irregular rainfall
- groundwater depletion
- poor agriculture and water use practices
- drainage patterns

3. Objective

Planning for optimal utilization of land and water resources using space technology for arid or semi-arid region on 1: 4000 scale.

4. Study area

For the pilot study, it is proposed to take up an area of 5 to 10 sq. km. of a watershed in an arid or semi-arid region in southern Indian state of Karnataka.

5. Data requirements

It is proposed to use three season satellite data for resource mapping such as current land use/land cover, geology, lithology, structure, geomorphology, ground water prospects, drainage line and surface water, soil and other related resource maps preparation. For detailed mapping on 1:4000 scale or better, it is proposed to use high resolution satellite data of less than a meter, or to use 2.5 m of SPOT image because the image covers 60 by 60 km for summer season. While for other seasons (spring and fall), moderate resolution of 6m imagery could be used for 5m SPOT imagery to have the same coverage area.

In addition to satellite data, other sources of information such as survey maps, field data, ancillary data, socio-economic data and laboratory analysis data, will also be used to complement satellite derived information.

6. Methodology

Satellite data will be used for the extraction of various thematic maps through a hybrid method of visual and digital techniques using ERDAS Imagine software. Extensive ground truthing will be carried out to support satellite-derived information and collection of field data as it is being mapped on 1:4000 scale at cadastre level. Standard methodology will be followed for analysis of various field data. Spatial and non-spatial data are integrated in GIS domain to arrive at locale specific and precision action plan for land and water resources management. Action plans will be validated by all concerned stake holders in order involve them in implementation and to incorporate their traditional wisdom and acceptability of the developmental plan. Implementation is being proposed through participatory approach in order to make them own the system as well as to bring transparency and accountability in

developmental activities. Mid course evaluation of the action plan and monitoring of the program will be undertaken after implementation.

7. Benefits

The proposed project after implementation are expected to provide the following benefits:

- provision of data to stake holders
- improved land and water resources management
- better ecology
- improvement of socio-economic conditions
- education and capacity building
- enhancement of the participatory approach

8. Implementation

A. Preparation of Project Proposal

Based on the approach given above, a detailed project proposal will be prepared and submitted to UN in 3 months time i.e. mid July, 2008.

B. Preparation of Land and Water Resources Action Plan

Generation of various thematic maps, data collection and analysis, integration of spatial and non-spatial data, action plan preparation and validation will be carried out from mid July 2008 to February 2009.

C. Implementation of Action Plan

The action plan will be implemented from first quarter of 2009. Total duration of implementation is 3 years from the date of commencement (2009 to 2012). (*Since a 3 year period is a long time for a pilot project, and the budget might not be available, we might consider dividing the project into several phases to achieve a shorter implementation time for each phase. This will be decided later with the Working Group.)*

D. Monitoring and Evaluation

It is proposed to have an independent agency undertake the monitoring of the project, which is in no way related to the implementing agency, in order get unbiased information on the project implementation activities as per the schedule. Evaluation of the plan is also being proposed in order to make any mid-course corrections in the developmental plan as well to assess the impact of the implementation programme at regular intervals.

9. Funding possibilities

The host institution will make the necessary efforts to obtain funds for the preparation of action plans for integrated development of land and water resources. In case of any difficulty, the UN may consider funding for the same.

However, soliciting member states for actual implementation of the project as well as monitoring and evaluation of the project will be the responsibility of the UN. The UN would either directly fund the project if funds available or assist member states to obtain funding support from other sources. One funding opportunity requested during the conference is through the Prince Sultan Bin Abdulaziz International Price for Water (PSIPW).

In addition, participants of the Conference recognized the importance of water harvesting and storage projects carried out by PSIPW and its potential for inexpensive water management systems in arid areas. The participants were in opinion that these experiments should be continued both in Saudi Arabia and in participants' countries."

B. WG 2 - Application of Space Technology and Data

The Group discussed the potential application of project ideas. Since there is no existing funding budget for these potential projects, the Working Group members will explore possibilities of applying for funding from various sources. UN OOSA will endorse the applications and continue monitoring its progress.

The project ideas are in the following thematic topics:

1. Application of remote sensing data to solve hydrological problems

There is a need for the projects which will fill the gap of remotely sensed data optical and microwave for hydrological problems. Our objective is to apply Remote Sensing data to solve hydrological problems. The area of study would be arid and semi-arid area.

Remote sensing methods give strong possibilities to conduct the investigation on water resource examination... There is a strong need for the Projects which will fill the gap of remotely sensed data - optical and microwave for hydrological problems especially for arid and semi-arid areas. The data from existing microwave satellites such as: RADARSAT-1, 2, ENVISAT and ALOS may be used for the purpose of the Project. As it was proved that in arid areas microwave is more sensitive to moisture and in dry conditions the wave may penetrate much deeper than in the areas where the conditions were moist.

The combination of optical data from TERRA-MODIS, TERRA-ASTER and NOAA/AVHRR give long history of data and possibility to assess water balance where evaporationspiration maybe calculated using surface temperature recorded by these satellites. Combination of microwave data and optical will give the width

information on hydrology. After rain when the water reservoir is filled there is a strong need to observe how water is distributed from the reservoir – and how spatially and temporarily the soil water conditions change.

2. Oil spill monitoring

There is a strong need to monitor the oil spill in various part of the world but especially in the Arabian Gulf as the leakage of oil from the tanks while the oil is being loaded. The best methods will be application of microwave data from RADARSAT, Terra –SAR-X; and ENVISAT. The methods for distinguishing the spots of oil are well known. The oil forms the thin and smooth surface on water. Due to mirror reflection the spots are dark.

3. Snow cover monitoring

Due to climate change, there is the need for monitoring the snow cover in Himalaya and Hido-kush area. This is observed and proposed by Pakistan participant. There is a need of data on high altitude to detect glacial snow coverage, glacial movement, melt, and glacial outburst lakes to monitor global impact, the best satellite data will be those with the long history of observation. Therefore Land sat TM, NOAA/AVHRR but also ERS and ENVISAT data. The problem of climate change is very important globally. The change in snow cover reflects to the changes in temperature, as well as water storage because when relieves will cause changes in the vast areas. *This topic can be applied to areas other than just Himalaya and Hido-kush, because if there is snow in the high mountain there will be good recharge to the ground water level and is valuable to understand this water source.*

4. Extend of salinity and water logging

Salinity and water logging is a great problem in warm climate where water evaporates very quickly. The phenomena occur in poorly drained soils where water can not penetrate deeply or water table raise. The excessive irrigation on poorly drained soils when water could not sink deeply causes water logging. Very often it is not possible to observe it until it is too late and the plants due to lack of oxygen are damaged. Such phenomena have to be observed in the arid and semi-arid regions. The best methods for observation in order to find the early stage of water exceeds is remote sensing data. It is suggested to use optical (Terra ASTER; Terra MODIS) and microwave data.

5. Setting up early warning systems for flood, drought, food, desertification, land use change, groundwater pollution, illegal drilling of wells and monitor harmful plants

Such a system should operate on various regional scales. For Bangladesh there is a strong need for setting the Flood System which will compose of precise digital elevation model (DEM) for the GMB basin. Accurate temporal and spatial rain estimation could be established from NOAA and ECMWF data for the entire GMB basin. For high river dynamics (erosion, deposition, river shifting) high satellite imagery are required as optical but also microwave data. The System will be set as Warning System ready to make the forecast for flood, flood extend and assessment of devastated area through flood.

Early warning system will be set for arid and semi- arid areas based on Remote Sensing data. The system will include monitoring of vegetation growth conditions and moisture conditions, estimation of evapotranspiration and crop production assessment. Also the system will deliver the information on irrigation and monitoring the irrigated areas in order to avoid the water logging problems. Drought is one of major disaster effecting agriculture. During the drought years the production drops significantly. Therefore, early drought detection and monitoring the area and drought expansion is considered as very important component in early warning system. Information about drought can be obtained from some of ground observation (meteorological data and crop observation Survey). This information comes from relatively low-density network and quite often is not available early enough in order to make accurate estimates of crop production. Therefore the attempt will be undertaken to use satellite data to detect drought and monitor its expansion in order to estimate its impact on crop production. The effect of drought on the environment will be examined using high resolution satellite data and microwave data ERS-SAR; ENVISAT ASAR. Recently a successful attempt has been launched to use low resolution NOAA AVHRR and TERRA MODIS for early drought detection and monitoring for real-time assessment of crop conditions. The high resolution LANDSAT TM data may be used to differentiate crop and natural vegetation areas and also to create the agricultural mask for the whole region. The various indices will be used applying historical satellite data as AVHRR or MODIS. We propose the indices as Vegetation (VCI) and Temperature (TCI) Condition Index. The correlation analysis will be performed to investigate potential of VCI/TCI for crop yield estimation. The indices are useful in early drought detection, tracking mapping. Also the System will include the land use changes in respect to settlements using high resolution data.

6. Projects on various water related studies

The Working Group discussed potential project ideas such as: ground water exploitation, sea level water monitoring, shape of the bottom of various reservoirs, detection and exploration of ancient water systems, and changes in water supply. Setting the projects on inventory and modelling of the shape and the bottom of the lakes and rivers for determination capacity of reservoirs and water volume using integrated remote sensing and digital bathymetric measurements. These project will be based on regional level.

There are already projects being suggested by participants, or in planning, or presently existing. They are as follows:

- Dr. Yalcin Arisoy of Dokuz Eylul University in Turkey is planning to lead a project on developing a GIS-based inventory of ancient water work.

- Eng. Abdullah Abdulwahed Al-Adimi of National Water Resource Authority (NWRA), Sana'a Yemen, suggested a project on fighting Qat cultivated in Yemen in order to save the groundwater.

Overall, in order to synergize efforts, it is important for participants to urge their governments to collect and provide high quality data and facilitate the exchange of

knowledge and expertise within and among countries in arid and semi-arid areas of the world.

C. WG 3 - Capacity Building, Data Policy, International, Regional, and National Cooperation

Dr. Tarabzouni laid the foundation for this group's discussion, and will lead the group, along with the co-chair Dr. Jarrah Al-Zu'BI, for further actions.

The Working Group discussed the following:

1. Training, capacity building, and regional centers

The issue of establishing a regional centre of Arabic language was discussed. The background was: It was approved at the United Nations General Assembly to establish regional centres of space science and technology education, affiliated to the United Nations. Currently there 4 centres exist that are hosted by the following:

- Two campuses in Latin America and the Carribean regions: Brazil and Mexico
- One in Morocco for French speaking Africa
- One in Nigeria for English-speaking Africa
- One in India for Asia and the pacific region
- One approved for west Asia but has not been established.

The regional centres offer nine-month postgraduate courses annually to benefit the region. A centre in west Asia region was approved and Jordan was selected to host the Arab Regional Space Centre. ACSAD would support the activity regionally.

The Working Group discussed the need of a regional centre to be established. Dr. Jarrah Al-Zu'BI and Ms. Nivan Hassan volunteered to take actions, under the advisory of Dr. Tarabzouni, to pursue the establishment of the centre for the region.

The WG also discussed the need of having educational institutes and universities to offer training program on Remote Sensing and GIS technologies in their curriculum for short or long courses. UNOSAT of UNITAR might provide training. The WG co-chair Dr. Jarrah Al-Zu'BI will coordinate with OOSA to make initial contact with UNOSAT for the possibility.

The maintenance of a system and operational budget are key factors to be considered for certain institutions in Arab countries. Training modules for basic space technologies are needed, as well as for specialists in proper technical language (English). Translation of materials is recommended.

2. Establishing regional or global teams to cooperate in pilot projects

Since the Working Group 3 was comprised of private companies, data providers and regional and international co-operation programmes, the discussion addressed how to establish co-operation based on the results of the other two groups projects. The WG will find ways to cooperate with data providers, local, regional and international

organizations and private companies to provide data, finance and advisory services. WG 3 decided to:

- Finding out where they can get free data and how can provide data at law cost to their need;
- Giving priorities for the projects which have major impact regionally or globally;
- Seeking financial and advisory support;
- Establishing a focal point contact for each local, regional and international project.

3. Data availability

A long-term planning requires stable data availability from data providers and a mechanism of sharing data. We need to first identify our data needs and a stable source of data. Low resolution imagery is sufficient for covering major aspects of water resources management. We need to focus on developing appropriate projects.

The acquisition planning system is a key issue for satellite launching companies. Argentina Space Agency CONAE (www.conae.gov.ar) can provide 35m resolution and multispectral images free of charge from SAC-C MMRS satellite.

The point of contact of Argentina data is: Mr. Felix C. Menicocci. Email: fmen@conae.gov.ar

4. Data sharing/Capacity sharing

Data should be shared for common use appropriately. Prioritisation list of space application projects needs is the first step. Indigenous capacity takes time to build. We should find a way to share and synergize the skills on national or regional level. The WG3 recommended the following:

- Since UN Programme on Space Applications has a list of available experts in various thematic areas. National and local organizations are recommended and encouraged to make inquiry to the staff members of UN OOSA to information on their needed expertise.
- Participants are encouraged to view the UNOOSA web site routinely to get information of on-going programmes, activities and regional centre courses related Water Management using space technologies. The web site is http://www.unoosa.org/oosa/index.html
- National, regional and international database should be developed in co-ordination for harmonization. The initiative should start at the local level.
- Local organizations should be active in finding the appropriate expertise or information available internationally.
- Each country should know their available water resources.

5. Data Policy

An analysis of available data (data catalogue) and an evaluation of data needed are the first steps for establishing national data policy. The data policy should include:

how to use the data and who can use the data, licensing of the data. It could be supported by UN for specific projects with specific goals. The identification of focal points at decision-making positions would facilitate the process. Standardisation of data is also a needed and time-consuming issue.

6. Pilot projects

To define pilot projects is a necessary step and a best way to achieve goals. It can be done during a workshop. Donors would benefit from funding regionally focused projects. Africover and FAO provide low resolution data to certain countries. But a regional approach would be more cost-effective.

KACST, a non-profit organization, can provide for example IKONS images of Saudi Arabia region. For data request to KACST, the point of contact is: Space research Institute, email: serv.sri@kacst.edu.sa

Recommendations on choosing pilot projects:

1. Desertification, climate change and better water resources management are issues shared by many regions that should be addressed.
2. Issues should be tackled one by one.
3. Pilot projects should be regionally specific, and also with common objective among regions.

7. Networking

Satellite builders sometimes derive space solutions without thoroughly evaluating the users need. The user testing stage is crucial for satellite builders. A strategy is needed. Lessons learnt in each country could be shared in an Internet-based network.

Recommendations

1. Networking should include a state-of-the-art of the available data and data needs.
2. A website should be designed and maintained to animate the network.
3. Decision-makers should be identified.
4. Proactive in contact with scientists, based on space agencies, and make a list of the available scientists who volunteer to provide advisory services.
5. The UNESCO-IHP framework should be used for developing the network website and database.

8. Budget availability

The main issue faced is the budget availability. The Prince Water International Prize found that United Nations support can be provided in addition. Space applications have to be presented at the highest level.

The WG 3 discussed the possibility of taking the following actions:

- Each country identifies its main issues in water management;

- Issue a questionnaire on training needs in each country (GIS, remote sensing applied to water resources management, IWRM)
- Training of the trainers (more than 1 person per country if possible)
- Hold regular workshops or conferences and training materials via a UN-OOSA/UNESCO-IHP selected Working Group
- Raise awareness to decision-makers
- Participate in the 5th World Water Forum and the Arab Water Council: by submitting papers especially for the topics in the area of Providing Water for Sustainable Development: (Contact person of the conference is Mr. Hasan Basri YÜKSEL, basriyuksel@gmail.com)
    - Global Changes & Risk Management
    - Advancing Human Development and the MDGs
    - Managing and protecting water resources and their supply systems to meet human and environmental needs
- Inform conferences on www.unesco.org/wwap

Annex: Working Groups Member List

#	Name	Country	Company Name	E-mail Address
			WORKING GROUP 1	
1.	Eyad Ali AL-FALAH	Kuwait	Ministry of Electricity and Water	efalah@mew.gov.kw
2.	Ebrahim ALKAABI	Bahrain	Electricity & Water Authority	alkaabie@batelco.com.bh
3.	Saleh EBRAHIM	Bahrain	Electricity & Water Authority	salehebrahim@hotmail.com
4.	Amar DIF	Algeria	Centre of Space Techniques	adif@usa.com
5.	Ibrahim GEDIK	Turkey	DSI Genel Mudurlugu	igedik@dsi.gov.tr
6.	Murat HATIPOGLU	Turkey	DSI Genel Mudurlugu	mhatipoglu@dsi.gov.tr
7.	Honne Gowda HUSKUR	India	Karnataka Science & Technical Academy (KSTA)	hg_huskur@yahoo.co.in
8.	Muhammad SAIDAM	Jordan	Royal Scientific Society	m.saidam@emarcu.gov.jo m.saidam@rss.gov.jo
9.	Sayed Sanaullah SHAH	Pakistan	SUPARCO	sanaullahbukhari@gmail.com
10.	Tint ZAW	Mayanmar	Irrigation Department	dds2-irr@myanmar.com.mm
			WORKING GROUP 2	
1.	Mustafa Resit AKDOGAN	Turkey	TURKSAT Satellite Com AS	mra@turksat.com.tr
2.	Mustafa AKYUZ	Turkey	General Directorate of Disaster Affairs Ankara	guldereli.m@gmail.com
3.	Abdullah AL-ADIMI	Yemen	NWRA	abdullahadimi@yahoo.com
4.	Hussah Saif AL-SAIF		GRC	h_d_1424@yahoo.com
5.	Abdulaziz J. AL-SUMAIT	Kuwait	Ministry of Electricity & Water	al_sumait33@hotmail.com
6.	Saiwa AL-QUNAIBET			salwaq@gmail.com
7.	Yalcin ARISOY	Turkey	Dokuz Eylul University	yalcin.arisoy@deu.edu.tr
8.	T.S. CHOUHAN	India	University of Rajastan	chouhants@gmail.com
9.	Ayhan CIFTCI	Turkey	General Directorate of Disaster Affairs Ankara	ciftci.ayan24@gmail.com
10.	Senol COMEZ	Turkey	General Directorate of Iller Bank	senolcomez@hotmail.com
11.	Katarzyna DABROWSKA-ZIELINSKA	Poland	Institute of Geodesy and Cartography	kasia@igik.edu.pl
12.	Abass Mohamed EL HAG HAME	Sudan	Remote Sensing Authority	remotesensing_9@yahoo.com remotesensing9@gmail.com
13.	Essayas KABA	Ethiopia	Bahirdar University	essayask@gmail.com
14.	Maria Elena KHIRLAN	Jordan	Royal Jordanian Geographic Centre	khmaria@hotmail.com
15.	Manzooy Ahmad MALIK	Pakistan	PCRMR, Ministry of Science	mamalik379@hotmail.com
16.	Mohamad MELHIM	Syria	GORS	melhem333@hotmail.com
17.	Stainslaw OSZCZAK	Poland	University of Warmia and Hasury	oszczak@uni.olsztyn.pl
18.	Sefiani SANAE	Morocco	Royal Centre of Remote Sensing	sefiani@crts.gov.ma
19.	Al Sultan SULTAN	KSA	ISPRS UNU of Qassim	computer_305@yahoo.com
20.	Micheline TABACHE	France	ESA	micheline.tabache@esa.int
			WORKING GROUP 3	
1.	Ali-Wafa ABU-RISHEH	KSA	PSIPW PSRCEWD/KSU	aliwafa@gmail.com, aliwafa@ksu.edu.sa,
2.	Shahnaz ABU-TAYEH	Jordan	Royal Jordanian Geographic Centre	nivertity2000@yahoo.com
3.	Abdulmalik A. AL-SHAIKH	KSA	PSIPW	
4.	Mohammed AL-SUBAIE	KSA	General Commission for Survey	alsubaie_m_2000@yahoo.com
5.	Redwan AL-WESHAH	France	UNESCO	r.weshah@unesco.org
6.	Jarrah ALZUBI	Jordan	Al Balqa' Applied University	jarzubi@hotmail.com
7.	Nivin A. HASAN	Jordan	Royal Jordanian Geographic Centre	nivin1000@yahoo.com
8.	Julie LADEL	France	AMESD/CICOS Programme	julie.ladel@amesd.org
9.	Felix MENICOCCI	Argentina	National Commission on Space Activities (CONAE)	fmen@conae.gov.ar
10.	Hoang NHUYEN THI MY	Viet Nam	Environmental Protection Agency	nmhoang@nea.gov.vn
11.	Gorgon SABUSHIMIKE	Burundi	Youth Strategy for Disaster Reduction	sabugorgon@usa.com
12.	Sameh SAKR	Egypt	ACSAD	sameh_nw@hotmail.com s.sakr@acsad.org
13.	Alexander SEMERIKOV	Russia	Federal Sapce Agency, Research Centre for Earth Operative Monitoring	semerikov@ntsomz.ru
14.	TARABZOUNI, Mohamed	KSA	King Abdulaziz City for Science and Technology (KACST)	mtrabzon@kacst.edu.sa,
15.	Hassan Basri YUKSEL	Turkey	DSI Genel Mudurlugu	basriyuksel@gmail.com