



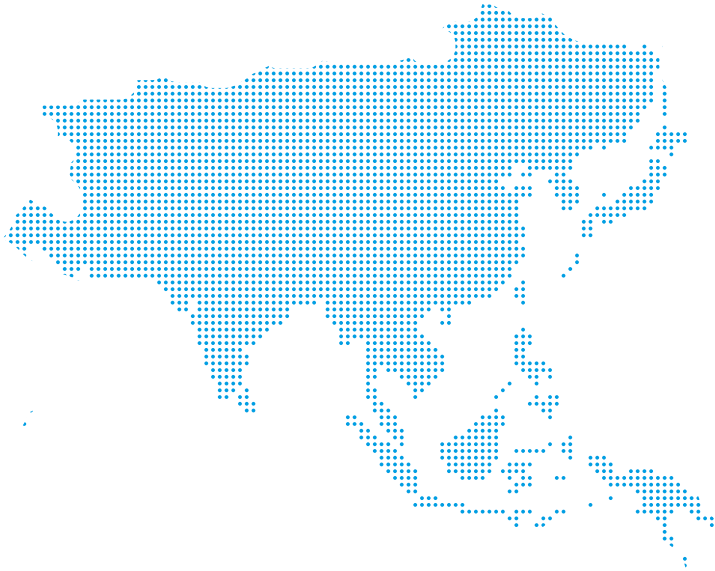
5 Years

PROGRESS REPORT



**Indian Institute of Remote Sensing
Dehradun**

5 Years PROGRESS REPORT



Dr. A Senthil Kumar
Director

**Centre for Space Science & Technology Education
in Asia & the Pacific (CSSTEAP)
(Affiliated to the United Nations)**

**Centre for Space Science & Technology Education
in Asia & the Pacific (CSSTEAP)
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OUR VISION

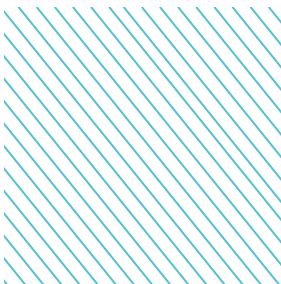
Human resource development in the Asia-Pacific region in applying space science and technology for sustainable development of the region, achieved through academic excellence thereby enabling all learners to reach their individual potential.

This endeavour should result in the development and growth of technically and managerially competent human network, who can use those aspects of space science and technology that could have greater impact on the country's economic and social development including the preservation of its environment.

The Centre to emerge as a nodal institution in the region which will focus, in addition to education, on specific regional issues of development through close cooperation between the countries, leading to integrated programme of space applications for regional development.

It is our hope that in years to come, no country in the region will have to look abroad for expertise in Space Science & Technology application, but will find them ready at home.

A. Senthil Kumar
Director, CSSTEAP



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FOREWORD



The phenomenal growth of scientific knowledge and its contribution towards the development of society are well recognized over the years. Our lives depend greatly on our understanding of planet Earth. Space technology enables us to observe resources available on Earth, understand the earth's environment and enable assessment of its impact on lives of people. It offers several economic and social benefits towards addressing the needs of socio-economic security, sustainable development and disaster risk reduction. Recognizing the potential of space technology for societal benefit, The United Nations, through its Officer for Outer Space Affairs, facilitated the establishment and operation of the Centers for Space Science and Technology Education, affiliated to the United Nations for capacity building in different region of the world.

The Centre for Space Science and Technology Education for Asia and the Pacific (CSSTEAP) was the first Centre established in 1995 with India as host country. CSSTEAP is committed to build academic excellence in the Asia-Pacific region and develop technically and managerially competent human networks to exploit the potential of space science and technology and harness it for the socio-economic development of countries, including the preservation of their environment. Over the past two decades, CSSTEAP has evolved as a Centre of Excellence and has become a role model for space education in the Asia and the Pacific Region. So far, about 1600 participants from 35 Asia Pacific countries have benefitted from various academic programmes of CSSTEAP.

At CSSTEAP, we strive to improve the courses based on the feedback from the students and faculty and also assess the performance of the Centre from time to time. The first report on assessment and performance evaluation of Centre was made in 2009. This is second such report, which highlights the current programmes, achievements, performance assessment and future goals of the Centre.

The Government of India through Department of Space continues to provide technical, infrastructural and financial support to the Centre, to ensure the nations of Asia-Pacific region are benefitted from the Centre's education programmes. I solicit enhanced support from all the nations to the Centre and reap benefits of space technology applications for socio-economic development in the region.

आ सी किरण कुमार

(A.S. Kiran Kumar)

Chairman, CSSTEAP-GB

August 25, 2016



PREFACE

The Center for Space Science and Technology Education in Asia and the Pacific (CSSTEAP) has been contributing significantly in empowering scientists and engineers in Asia Pacific countries in the frontier areas of Space Science and Technology and their Applications since its inception in 1995. In particular, its contributions have been focused on basics and applications of Remote Sensing and Geographic Information Systems, Satellite Communications & Global Positioning Systems, Satellite Meteorology & Global Climate, Space & Atmospheric Science and Global Navigation Satellite System, which are well recognized by UNOOSA as potential subjects for societal benefit applications.

The continued progress of this Centre will depend upon its periodic assessment on performances through feedback from course participants, the alumni members and Governing Board for time-to-time improvement in course syllabus and facility updating based on needs of these fast-growing frontier areas. The CSSTEAP has an Advisory Committee in place, which meets once in 3 years to upgrade the course curricula and suggest new courses based on needs of the regional demands. It is thus a combined support, recommendation and co-operation of the Department of Space, the UNOOSA, the Governing Board members and the Advisory Committee, Program and Course Coordinators as well as Faculty that keeps the CSSTEAP as a preferred choice of learning centre of international class.

This report is a follow up of previous performance assessment report published in 2009. This report provides information on how Centre has progressed in last 6 years (2010-2015). The feedback provided by the CSSTEAP alumni plays an important key role in understanding gap areas and providing scope for improvement. Finally, prime focus is given on future needs. I am sure, that this report will provide path for enhanced role of the CSSTEAP to address and solve critical issues faced in the Asia-Pacific regions.

I sincerely thank Chairman, CSSTEAP Governing board for his constant guidance and encouragement. I thankfully acknowledge the Governing Board members, Advisory Committee members, Directors Host Institutions, Program Coordinators, Course Directors and Faculty, and host country for their continuous support and valuable suggestions which enables CSSTEAP to pursue as Center of excellence.

(A. Senthil Kumar)
Director, CSSTEAP



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INTRODUCTION

Centre for Space Science and Technology Education in Asia and the Pacific Affiliated to the United Nations

Background of the Centre

The Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP) was established in India on November 1, 1995. The United Nations Office for Outer Space Affairs (UN-OOSA) facilitated the establishment of the Centre, acting on recommendations by the UNISPACE-II (1982) Conference and the UN Committee on the Peaceful Use of Outer Space (COPUOS), endorsed by the UN General Assembly.

The Centre's headquarters is located in Dehradun, India, and its programmes are executed by staff of the Department of Space (DOS) at campuses in Dehradun, Bengaluru and Ahmedabad. These include the Indian Institute of Remote Sensing (IIRS) in Dehradun, the Space Applications Centre (SAC), the Physical Research Laboratory (PRL), both at Ahmedabad and ISRO Satellite Centre (ISAC), Bengaluru. An agreement between CSSTEAP and UN-OOSA was signed in May 1996 to formalize the affiliation of the Centre to the UN and host country agreement signed by Govt. of India in March 1998.

The mission of the Regional Centres is to establish national capabilities in developing countries to design and implement education, research and application programmes in space

science technology and applications, in particular, in the areas of (1) remote sensing & geographic information systems (RS&GIS), (2) satellite communications (SATCOM), (3) satellite meteorology & global climate (SATMET), (4) space & atmospheric sciences (SAS), (5) Global Navigation Satellite Systems (GNSS) and (6) Small Satellite Missions (SSM).

CSSTEAP conducts all of its educational programmes in close association with the DOS institutions and thus has direct access to the physical facilities and intellectual capabilities of the institutes. In addition to providing facilities, infrastructure and skilled manpower, the Government of India, through the Department of Space, also provides most of the funding for the Centre.

Under the host country agreement, Dept. of Space has made available all facilities, infrastructure, budget and professional expertise to the Centre. The centre conducts all its educational, training and research programs at Indian Institute of Remote Sensing, Dehradun for RS&GIS course, SAC Ahmedabad for SATCOM, SATMET & GNSS courses; PRL Ahmedabad for SAS course & ISAC, Bengaluru for SSM course.





INTRODUCTION

Objectives of the Centre

The Centre is an education & research institution that aims at high attainment in development & transmission of knowledge in the field of space Science & technology. The Centre aims to offer best possible education, research & applications experience to its participants in all its programmes. The principal goal of the Centre is to develop skills & knowledge of professional working in Government, research institutions & other organizations and university faculty in the related or relevant fields. This is to be achieved through rigorous theory, practical and demonstration, field exercises and pilot projects in those aspects of space science & knowledge that can enhance social & economic development in each country. These programmes aim at the development of indigenous capability for participating countries in designing & implementing space based research & application programmes.

Against this background, the major objectives of the Centre are:

- To develop the skills and knowledge of university educators, environmental research scientists and project personnel in the design, development and application of space science and technology for subsequent application in national and regional development and environment management.
- Assist educators to develop environmental and atmospheric sciences curricula that they can use to advance the knowledge of their students in their respective Institutions / Countries.
- To develop skills for satellite communications including those associated with rural development, long distance education, delivery of health services, disaster mitigation, air and maritime navigation, and network / linkage of the region's professionals and scientists.
- Assist research and application scientists for preparing space-derived information for presentation to the policy and decision makers in-charge of national and regional development programmes.
- Enhance regional and international cooperation in space science, technology and applications programmes as envisaged in the strategy and action plan adopted under the Beijing declaration on Space Technology applications for environmentally sound and sustainable development in Asia and the Pacific.
- Assist in disseminating to the general public the value of space science and technology in improving their everyday quality of life.





Education Programme at CSSTEAP

The educational programme of the Centre is oriented towards the dissemination of knowledge in relevant aspects of space science technology and applications. The major educational and training programmes of the Centre are in the following disciplines:

- Remote Sensing and Geographical Information System (RS&GIS) ñ Post Graduate 9 months course conducted every year since 1996
- Satellite Communications (SATCOM) ñ Post Graduate course conducted every alternate odd year since 1997
- Satellite Meteorology and Global Climate (SATMET) ñ Post Graduate course conducted every even year since 1998
- Space and Atmospheric Science (SAS)- Post Graduate course conducted every even year since 1998
- Navigation and Satellite Positioning System (NAVSAT)- Short Course conducted every year since 2012 to 2014
- Small Satellite Missions (SSM)- Short Course conducted every year since 2012
- Global Navigation Satellite Systems (GNSS) ñ Post Graduate course conducted every alternate odd year since 2015
- Short course conducted every year on one of the theme-Geospatial, image Processing & RS technology, Disaster Risk Reduction & management; Coastal & Terrestrial Ecosystem, Natural Resource Management, Infrastructure, Climate Change Studies, etc.
- Short course/ Workshops on a theme on SATCOM, SATMET & SAS disciplines.
- In addition to above, Centre also organizes user demand short courses from Governing Board countries/ organizations, UNESCAP, UNSPIDER, IWMI and other agencies.



Course participants during lecture



Education Programme at CSSTEAP

The Post Graduate Courses of the CSSTEAP are organized in two phases:

Phase-I (in India)

- Core modules, where the emphasis is on the development and enhancement of the knowledge and skills of university educators, researchers and application scientists.
- Pilot Project, oriented towards planning and executing project to be carried out in the home country as part of Phase II.

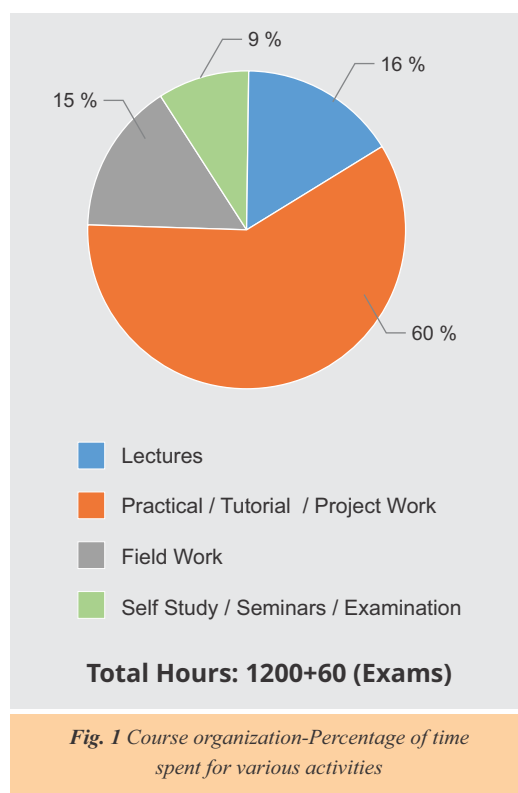
Phase II (in Home country)

- Research Project for scholars to conduct and execute projects in their respective countries with a view to transfer the technology to the next level of persons. It will also be a test of the methodology assimilated during the educational program in India.
- Andhra University (estd. 1926), Visakhapatnam, India award M.Tech. degrees to those eligible as per the norms of the Andhra University after successfully completing the CSSTEAP Course (Phase I & II).

A set of standard curricula developed by UN & updated, revised by CSSTEAP from time to time is adopted for the educational programmes. The Centre also conducts short-term courses, workshops and awareness seminars for scientists, technologists, teachers, policy-makers, decision-makers, planners, etc.



The PG diploma course is conducted into 3 modules each of three months duration. The modules are devised towards learning of fundamentals, and advance concepts, assignments, practical exercises on case studies, field work, instrumentations and practical modules. Average breakup of time for various activities is mentioned in figure 1. Teaching methods include classroom lectures, computer assisted practical/ assignments and demonstrations, laboratory experiments, group discussions, seminars and field work/case studies (as applicable). Lecture, practical and reading course material is provided to the students. The third module is oriented towards executing a pilot project enabling student to apply the knowledge gained during the course under expert supervision from host institution.





Education Programme at CSSTEAP

Major Achievements of Centre

Regular Academic Programme: During the past 19 years, 49 Post Graduate educational courses have been successfully conducted. In the last 6 years, the number is showing increasing trend and it is observed that the RS&GIS, SATCOM, SATMET PG courses have good student participation and performance (100%, 82%, 75%, respectively). Major success has been registered in the students of SAS PG course which has increased from earlier 70% to 85% due to steps taken by the Centre and GB members to inculcate interest between students and organization from the Asia-Pacific region. The details are mentioned in table 1 and country wise distribution is mentioned in Fig. 2. The year wise details of intake of students in each PG & Short course(s) is presented in table 2&3 and subsequent graphs (fig. 3). CSSTEAP has been organizing short courses on recent and advanced technological applications. In the last 6 years, 22 short courses/workshops on various themes have been conducted. There has been tremendous jump and interest from the professional, Governing Board member countries, organization, especially UN-ESCAP, UNSPIDER, SAARC and IWMI in organizing themes and demand specific short courses. Among the short courses, there is good students participation and performance is good (table 4-6 & fig. 4).

Other contribution

Since, year 2010, till 2015 Dept. of Space has provided budget for CSSTEAP academic, research, international travel support, monthly fellowships & other and administrative expenses of students. During last 6 years, this is up by 0.0% from annual budget average of ₹ 16.048 million per year during 1996-2009. Centre has started

new short courses in areas of Space science technology & applications, more fellowships to undergo MTech research studies, demand based thematic short courses, UN advisory missions meetings and alumni meets. During this period there has been upgradation in infrastructural, hostel, classroom, technical, laboratory, instrumental and computing facilities in respective host institutions which are not accounted in Centre recurring budget.

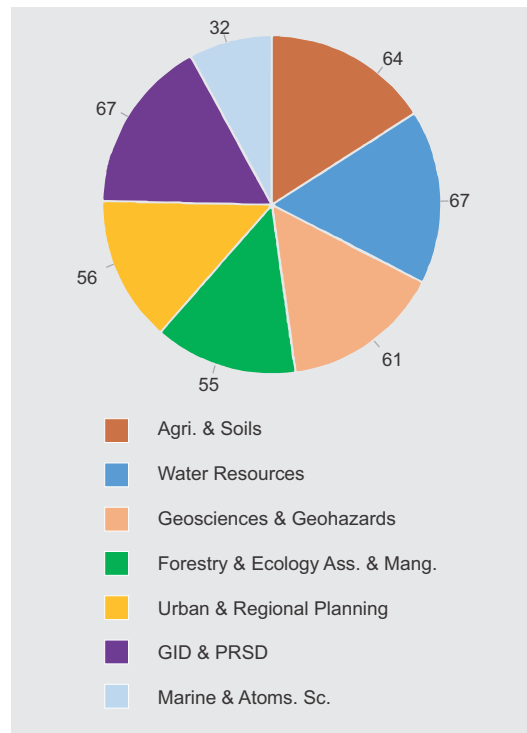


Fig. 2 Expertise Generated-
number of students trained in various disciplines



Education Programme at CSSTEAP

Conduct of the courses



Modern facilities exist at the Centre for class-room teaching and practical instructions/ demonstrations. Printed as well as digital course material of the lectures is supplied. The teaching methods include classroom lectures, video lectures, computer based training packages, laboratory experiments, group discussions, seminars and field work/ case studies (as applicable). Each course participant is provided with a computer and has access to all required application

softwares. The core faculty is drawn from IIRS and various reputed educational/research institutions from India and abroad. The faculty have a strong scientific background with long teaching and research experience.

The Centre has so far conducted 49 post graduate courses, 20 in RS&GIS, 10 in SATCOM, 1 in GNSS, 9 each in SATMET & SAS. These educational programmes have benefitted more than 1600 participants from 35 countries in the region.





Education Programme at CSSTEAP

International Recognition

CSSTEAP has International Collaboration with following institutions:

- University of Twente (ITC, Netherlands): An agreement has been signed between International Institute for Geo-Information Science and Earth Observation (ITC), The Netherlands and Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP) for exemption for PG diploma holders of the CSSTEAP "Post Graduate Course in Remote Sensing and Geographic Information System". All PG diploma holders of the CSSTEAP RS&GIS course can get exemptions for two or more modules of the ITC Postgraduate Diploma, Master degree or MSc. degree courses.
- University of Illinois, USA: An agreement was signed to establish a cooperative relationship through mutual assistance in the areas of education and research including joint educational, cultural and research activities; exchange of faculty members & advanced graduate students for research, lectures, and

discussions; participation in seminars and academic meetings.

- Andhra University, Visakhapatnam: For recognition of CSSTEAP PG courses with one year research work thesis for the award of M.Tech degree subject to the academic requirement and other qualifications.

Achievements

- discussions; participation in seminars and academic meetings.
- Andhra University, Visakhapatnam: For recognition of CSSTEAP PG courses with one year research work thesis for the award of M.Tech degree subject to the academic requirement and other qualifications.

The Centre has been conducting Post Graduate (PG) and Short courses in the five disciplines of space science and technology. Till date the Centre has conducted 49 PG courses (20 in Remote Sensing & Geographic Information System (RS & GIS), 10 in Satellite Communications (SATCOM), 1 in Global Navigation Satellite Systems (GNSS) and 9 each in Satellite Meteorology & Global Climate (SATMET) and Space & Atmospheric Science (SAS). It has also conducted several short courses and workshops in the past 19 years. These programmes have benefitted 1614 participants from 34 countries in the Asia-Pacific region. In addition to this, 29 participants from 18 countries* outside Asia-Pacific region have also been benefitted. PG courses have benefitted 813 participants while Short courses have benefitted 803 participants. (fig. 5)





Education Programme at CSSTEAP

Special Courses Conducted

- On request from UN-ESCAP Bangkok a special course for Pacific countries was organized by Centre on 'Remote Sensing and GIS applications for Coastal Hazards Mitigation and Sustainable Development' during December 5-16, 2011. A total of 12 participants representing Palau, Papua New Guinea, Sri Lanka, Tuvalu and Fiji attended.
- On request and financial support from UNESCAP Bangkok, UN-SPIDER Beijing and IWMI India and Sri Lanka, Centre organized a special course on 'Flood Risk Mapping, Modeling and Assessment using Space Technology during July 22-26, 2013. A total of 19 participants from 11 countries attended the course.
- On request and financial support from UN-ESCAP Bangkok Centre jointly organized a Sub-regional training on development of Geo-referenced Information Systems for Disaster Risk Management for SAARC countries during August 26-29, 2013. Sixteen participants from 9 countries attended the course.
- On request & financial support from South Asia Association of Regional Cooperation (SAARC) Disaster Management Centre (DMC), New Delhi, Centre jointly organized a special short course on iGIS and RS Technology in Disaster Risk and Emergency Management in South Asia from July 14 - 25, 2014. 21 participants from 6 countries attended.
- On request and financial support from UN-ESCAP, CSSTEAP Centre organized a special short course on iExpert Group Meeting and Specialized Training on Disaster Rapid Impact Assessment using Space-Based Information' from December 1-5, 2014 at IIRS Dehradun. A total of 16 participants from 6 countries attended the course.
- On request and financial support from UNDP, Bhutan and UNOOSA/UN-SPIDER, Beijing, Centre organized a special short course on iDisaster Response & Recovery Preparedness' for Bhutanese officials from April 13-17, 2015. A total of 19 participants from Bhutan attended the course.



Dedicated Computer facility for participants



Education Programme at CSSTEAP

M.Tech Research work

Capacity building by way of advance research in the area of space science and technology is one of the focus of the Centre. In last four years focus has been on encouraging participants to avail M. Tech. fellowship offered by the Centre and also pursue research in their home country. The number of M. Tech. students have increased and showing upward trend.

One year of research work leading to M.Tech. was initiated for selected meritorious students and so far 31 students in the last 6 years have

been awarded fellowships (12 in RS&GIS, 11 in SATCOM, 3 in SATMET and 5 in SAS) to complete their M. Tech degree. This has been around 30% up from those who completed their M.Tech in last 15 years.

Till date 136 participants from 16 countries have been awarded M.Tech. degree in the 4 disciplines. They are 66 participants in RS & GIS; 35 in SATCOM; 18 in SATMET and 16 participants in SAS.

Table 1: Post Graduate Courses conducted during 2010 to 2015

Countries	RS&GIS*	SATCOM*	SATMET*	SAS*	GNSS*
Algeria		1			
Bangladesh	5	3	3		2
Bhutan		1		1	
China	2				
DPR Korea	4		2	2	
Fiji	1				
India	12	16	7	12	4
Indonesia	1				
Iran	1				
Kazakhstan	7	1	8		1
Kyrgyzstan	8		3	5	
Maldives	1				
Malaysia			3		
Mongolia	16	12	6	8	2
Myanmar	7	1		2	
Nepal	9	10	1		
Philippines	2				
Sri Lanka	5	1	4	2	
Tajikistan	9		5	1	
Thailand	7		1		
Uzbekistan	11	2		4	
Vietnam	15	1	2	1	
TOTAL	123	49	45	38	9



Education Programme at CSSTEAP

Table 2: Year wise distribution of intake of students in PG courses

Year	RS/GIS PG Announced Seats (Joined)	SATCOM PG Announced Seats (Joined)	SATMET PG Announced Seats (Joined)	SAS PG Announced Seats (Joined)	GNSS PG Seats (Joined)
2010-2011	20 (15)	-	20 (14)	15 (12)	-
2011-2012	20 (22)	20 (17)	-	-	-
2012-2013	23 (21)	-	20 (14)	15 (14)	-
2013-2014	23 (20)	20 (16)	-	-	-
2014-2015	23 (21)	-	20 (17)	15 (12)	-
2015-2016	20 (24)	20 (16)	-	-	10 (9)

Table 3: Year wise distribution of intake of students in Short courses

Year	RS & GIS	NAVSAT	SSM
2010	31	-	-
2011	64	-	-
2012	58	20	20
2013	54	16	15
2014	57	19	19
2015	38	-	20





Education Programme at CSSTEAP

Table 4: Theme of short courses conducted during 2010 to 2015

S.N	Year	Name of the Short Courses
1.	2010	Special Course on High Resolution Aerospace Image Analysis for Geo-Hazard Assessment (HRA)
2.	2010	Application of Space Technology for Disaster Management Support with emphasis on Geological Risk Mitigation (4 weeks) (DMS)
3.	2011	Workshop on Opensource Geospatial Tools (2 days) (OSGeo)
4.	2011	Short Course on Microwave Remote Sensing and its Applications (4 weeks) (MWRS)
5.	2011	UNESCAP Sponsored Short Training Course on Remote Sensing and GIS Applications for Coastal Hazard Mitigation and Sustainable Development for Pacific Countries (2 weeks)(CHMSD)
6.	2012	Workshop on Open Source Geospatial Tools (3 days) (OSGeo)
7.	2012	Short Course on Application of Space Technology for Disaster Risk Reduction (4 weeks)(DRM)
8.	2012	Short Course on Navigation and Satellite Positioning System (4 weeks) (NAVSAT)
9.	2012	Short Course on Small Satellite Missions (2 weeks) (SSM)
10.	2013	Short Course on Hyperspectral Remote Sensing and its Applications (4 weeks) (HRS)
11.	2013	UNESCAP, UN-SPIDER, IWMI & CSSTEAP sponsored short course on Flood Risk Mapping, Modeling and Assessment using Space Technology (one week) (FRM)
12.	2013	Short Course on Navigation and Satellite Positioning System (4 weeks) (NAVSAT)
13.	2013	UNESCAP sponsored Sub-regional training on Development of Geo-referenced Information System for Disaster Risk Management (4 days) (DRM)
14.	2013	Short Course on Small Satellite Missions (2 weeks) (SSM)
15.	2014	International Training Course on Microwave Remote Sensing (SAR) & its Applications (3 weeks) (MWRS)
16.	2014	Short Course on Navigation and Satellite Positioning System (4 weeks) (NAVSAT)
17.	2014	Expert Group Meeting & Specialized Training on Disaster Rapid Impact Assessment using Space-Based Information (5 days) (DREM)
18.	2014	SAARC Regional Training Programme on GIS & RS Technology in Disaster Risk & Emergency Management in South Asia (2 weeks) (EGM)
19.	2014	Short Course on Small Satellite Missions (2 weeks) (SSM)
20.	2015	Short Course on Disaster Response & Recovery Preparedness for Bhutanese Officials (5 days) (DRRP)
21.	2015	International Training Course on Geospatial Technologies for Coastal & Marine Disaster Management & Climate Change (4 weeks) (CMDMCC)
22.	2015	Short Course on Small Satellite Missions (2 weeks) (SSM)



Education Programme at CSSTEAP

Table 5: Summary of the number of participants for short courses (RS) during 2010 to 2015

Countries	2010 HRA-Gh	2010 DMS	RS&GIS Short Courses												
			2011			2012		2013			2014			2015	
			OS Geo	MWRS	CHMSD	OS Geo	DRR	FRM	DRM	HRS	MWRS	DREM	EGM	DRRP	CMD MCC
Afghanistan							1		1			3	1		
Algeria															
Azerbaijan															
Bangladesh	1			1	2		2		2	3	1	2	2		
Bhutan								1	2			1	1	19	
Cambodia								1							
China			1	2				2							
DPR Korea															
Fiji					4			1							
India	12	1	13	4		13	2	7	5	7	8	12	10		4
Indonesia				1				1							1
Iran			1	1											
Kazakhstan		1		2		2	2				3				3
Kyrgyzstan		1	1	2		2	2								2
Lao PDR		1					1								
Maldives		1							1				1		1
Malaysia				1											
Mongolia		2	3	2		1	1			1					1
Myanmar			3			2	1	1		1					1
Nepal	2	1	1	1		1	1	1	1	1		2	1		
Pakistan									1						
Palau					1										
Papua New Guinea					2										
Philippines				1		2	2	1							
Sri Lanka	1	3	1	1		1	3	2	2		2	1			2
Solomon Islands							1								
Tuvalu					2		1								
Tajikistan			1	2		2	2								
Thailand				1		2	1		1		1				2
Uzbekistan	1	2		1		1	2			2	1				
Vietnam		1	2	3		2	2	1		4	4				2



Education Programme at CSSTEAP

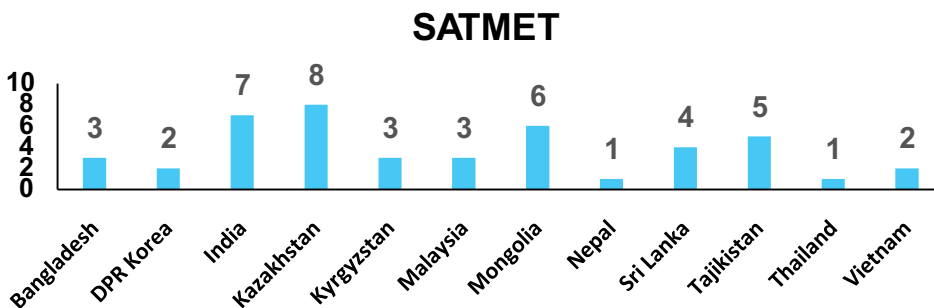
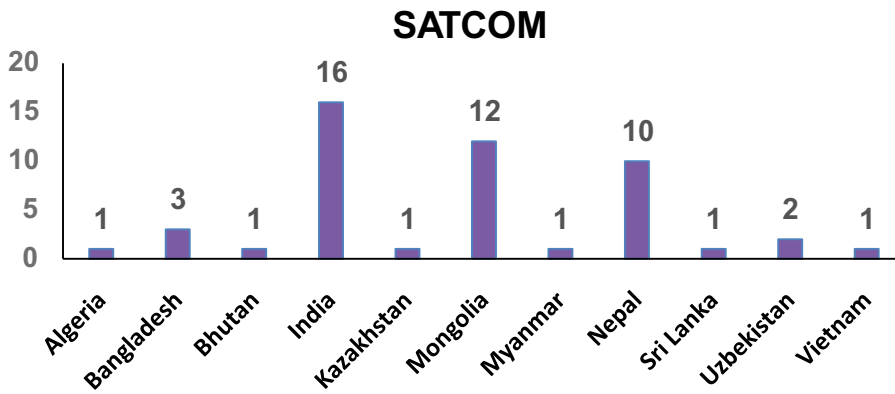
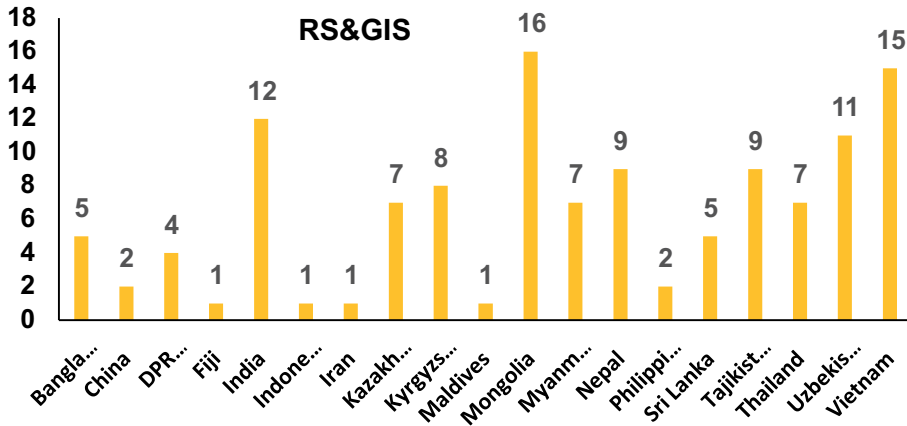
Table 6: Summary of the number of participants for NAVSAT and SSM short courses during 2010 to 2015

Countries	NAVSAT			SSM			
	2012	2013	2014	2012	2013	2014	2015
Afghanistan	1						
Azerbaijan				1			
Bangladesh	1	1	1	1	2		
Bhutan						2	
India 1	3	2	2	7	6	4	
Indonesia 2	1	3	1		3	1	
Kazakhstan	2			4	2	1	3
Kyrgyzstan		1	2			1	1
Mongolia 3	3	5	1		1	5	
Myanmar	2	1	2				
Nepal 2	2	2			1	1	
Philippines	3			1			
Sri Lanka 1			1	1	2		
Tajikistan 1	1				1		
Thailand	1						
Uzbekistan	2			2			
Vietnam 1	1	3	4	3	3	3	





Education Programme at CSSTEAP





Education Programme at CSSTEAP

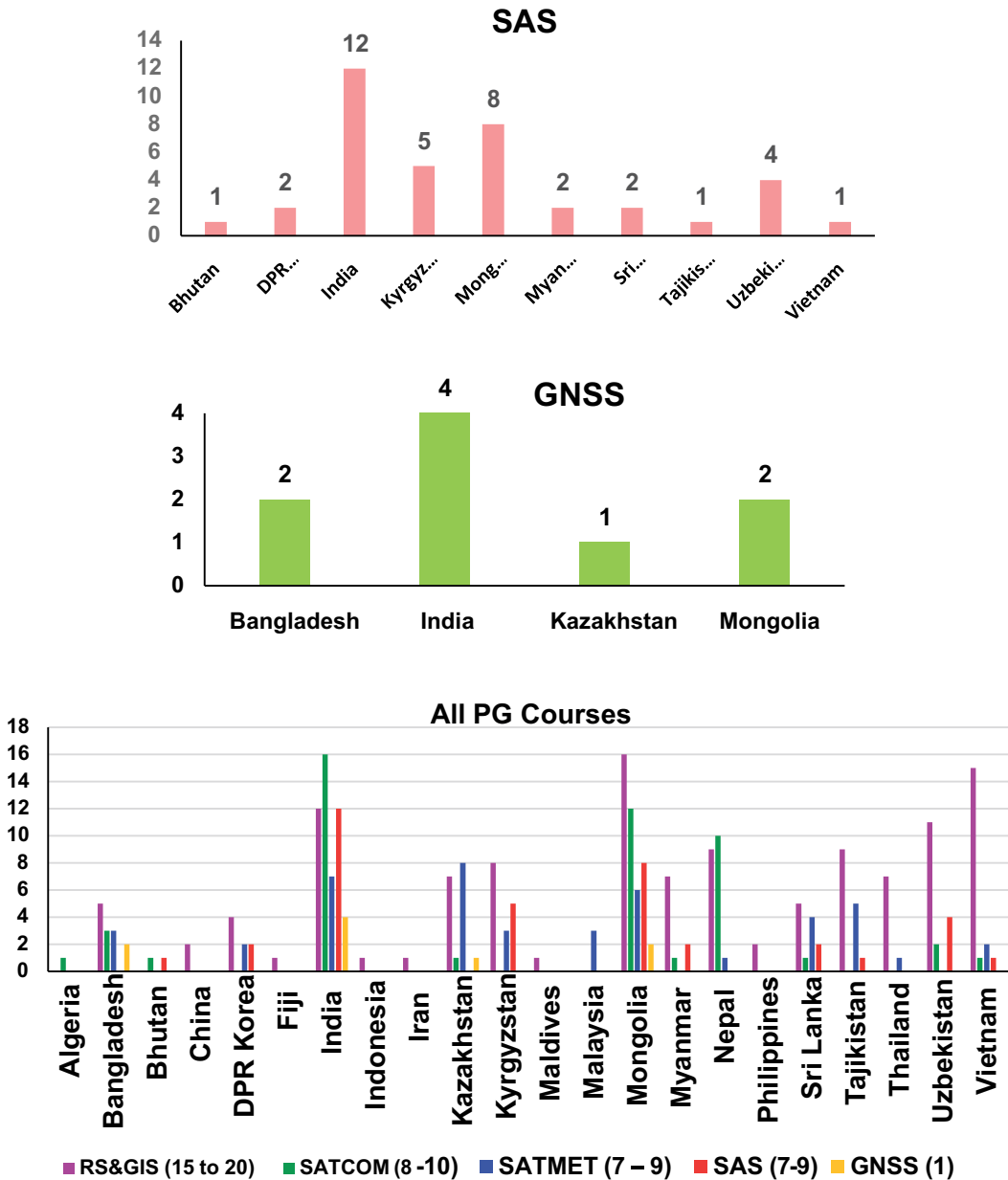
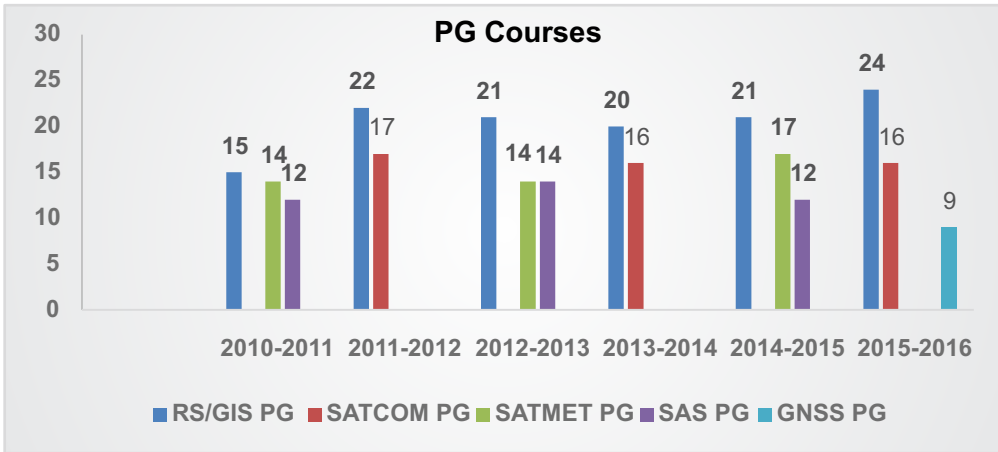


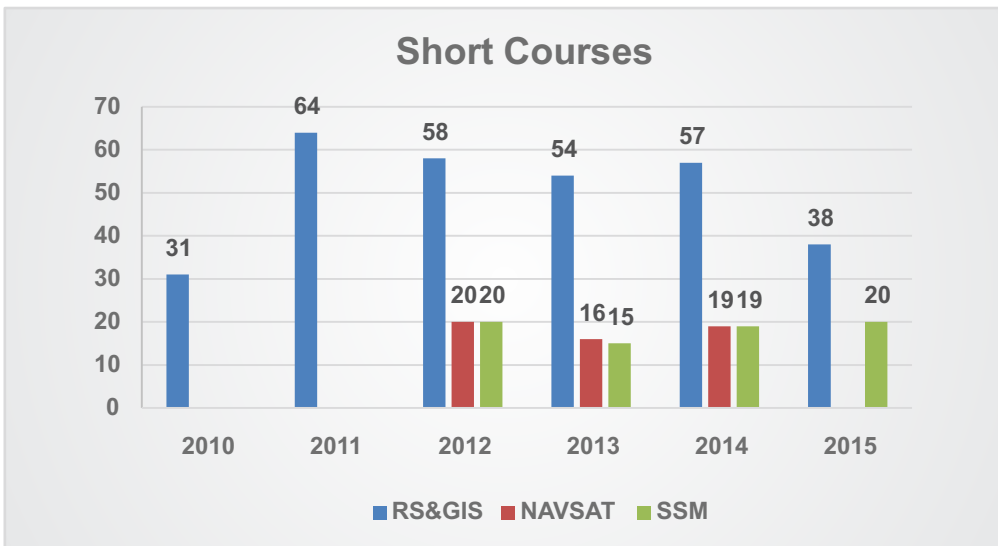
Fig.2: Country wise distribution in each PG course and overall PG course during 2010-2015



Education Programme at CSSTEAP



(a)

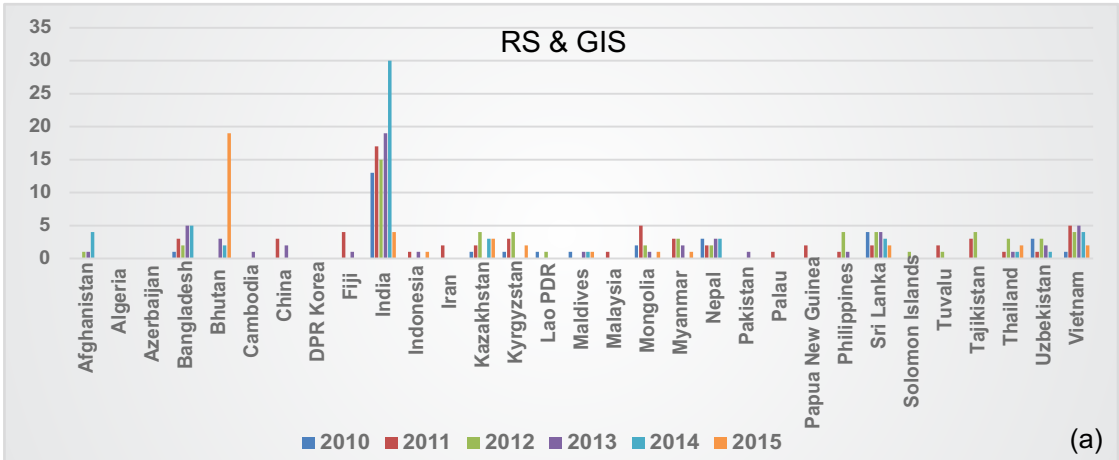


(b)

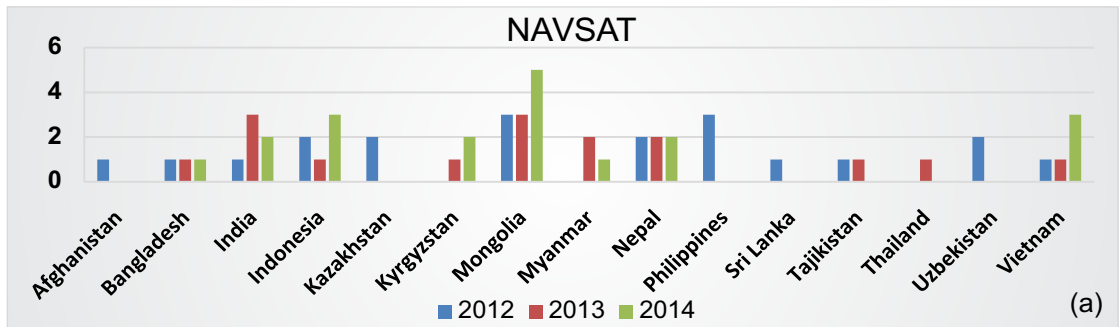
Fig3: Distribution of intake of students in (a) PG and (b) short courses during 2010-2015



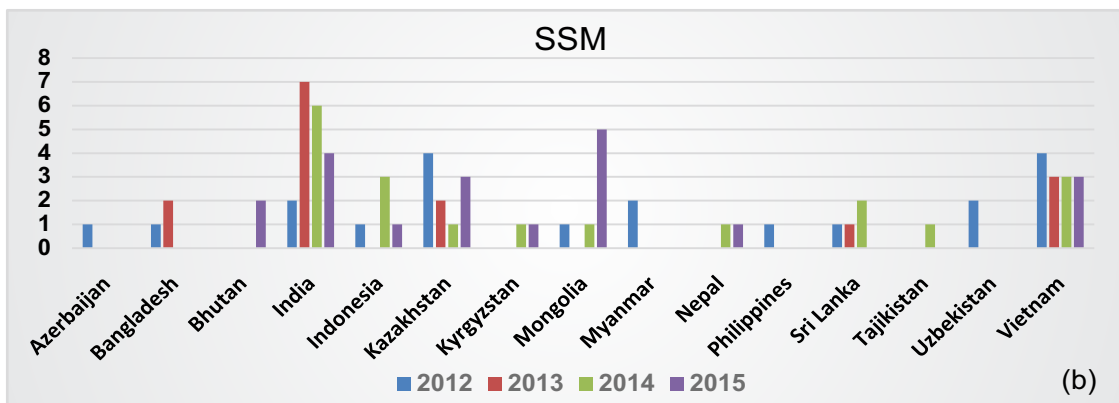
Education Programme at CSSTEAP



(a)



(a)



(b)

Fig 4: Country wise distribution of intake of students (a) RS/GIS (b) NAVSAT & SSM short courses during 2010-2015



Education Programme at CSSTEAP

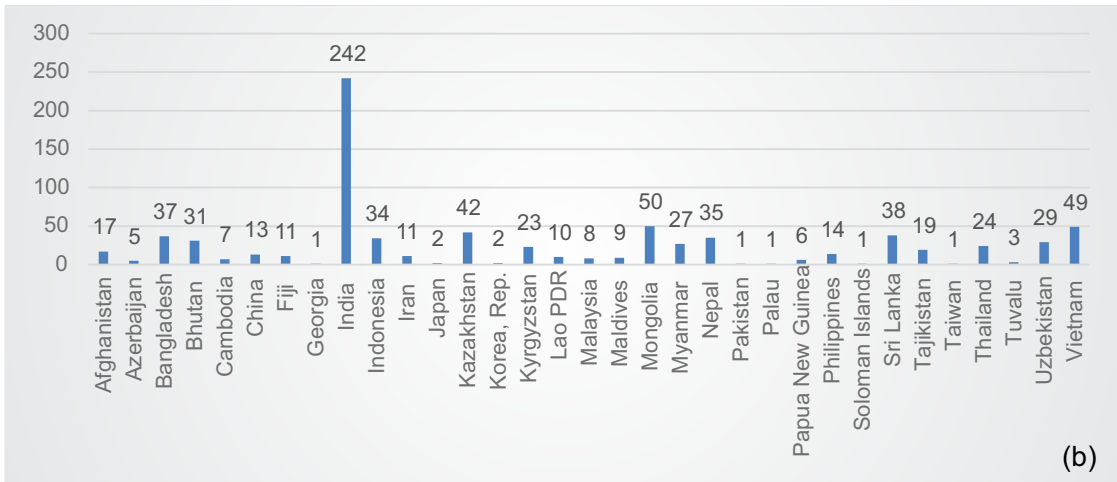
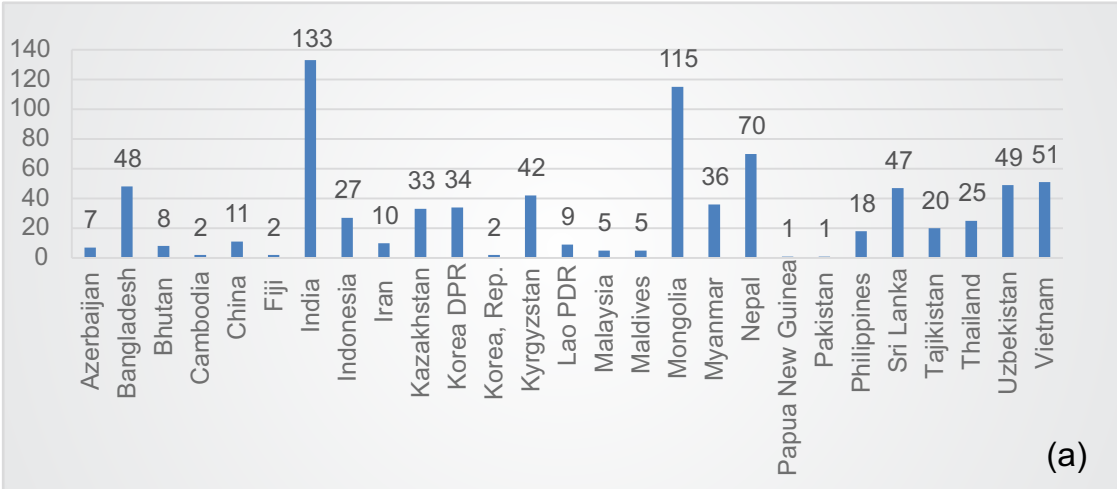


Fig 5: Overall student participation & country wise distribution in (a) all PG & (b) all Short courses of CSSTEAP



International Linkages

Visit of international delegation to CSSTEAP during 2010-2016

1. Visit of ICIMOD Board and Support Group Members

A team consists of 12 Board Members; 11 Support Group Members and 15 scientific staff of International Centre for Integrated Mountain Development (ICIMOD), Nepal visited CSSTEAP and IIRS, Dehradun on November 25, 2010. A scientific interaction meeting with the team members of ICIMOD, Course Director RS & GIS Course CSSTEAP, Dean, IIRS and Head of Deptt, was held. Dean, IIRS apprised on the activities of CSSTEAP and IIRS and on the technical and financial supports provided by ICIMOD since the inception of CSSTEAP. Dr. Andreas Schild, Director General and Mr. Basanta Shrestha, Head MENRIS, ICIMOD and team co-ordinator appraised about the present technical and research activities of ICIMOD. Board and Support Group Members also technically interacted with the team members of CSSTEAP/IIRS. The ICIMOD team members also visited various technical facilities of CSSTEAP and IIRS. Several future areas of collaboration between ICIMOD

and CSSTEAP & IIRS have been identified and these are :

- Joint training courses on application of geoinformatics on disaster management and other related disciplines of mutual interests;
- Development of mountain focused training/education curricula and courses;
- Provision of formal education to the RMC participants for post graduate programme at CSSTEAP;
- Distance education through EDUSAT on GIS/RS targeted to the youth;
- Collaboration on regional LULC mapping of the HKH region;
- Collaboration on joint project development and implementation of mutual interest;
- Exchange programme of scientists between IIRS/CSSTEAP and ICIMOD



Officials from IIRS/CSSTEAP holding meeting with officials from ICIMOD



International Linkages

2. Visit of Vietnamese Delegation



delegation constituting of Dr. Nguyen Ngoc Thach, Professor & Faculty of Geography. University of Science-Vietnam National University, Hanoi;

Dr. Nguyen Hieu, Vice dean of faculty of Geography, University of Science, Vietnam; Dr. Dinh Thi Bao Hoa, Head of Department of Cartography, RS & GIS, Faculty of Geography, University of Science, Vietnam and Dr. Chu Van Ngoi, Professor, faculty of Geology, University of Science, Vietnam National University, Hanoi visited CSSTEAP and IIRS on December 8, 2010. The objective of the meeting was to see the facilities and ongoing academic and research activities in CSSTEAP and IIRS and to explore the possibilities in joint collaboration between CSSTEAP/IIRS and Hanou Univeristy, Vietnam.

Dr. P.S Roy, the then Director, CSSTEAP and Dean, IIRS briefed the delegation on ongoing academic and research activities in CSSTEAP. There was a discussion on the possible future collaboration in terms of research and consultancy related to student exchange, research in water resources, irrigation, management, mapping & management of floods etc. The delegation expressed happiness to invite experts as Guest Lectures from CSSTEAP/IIRS in short courses in Vietnam. Director, CSSTEAP



mentioned that there are large number of participants taking benefit from the CSSTEAP academic programmes and requested to take appropriate steps for Vietnam becoming permanent member CSSTEAP Governing Board.

3. Visit of Diplomats of Embassy of Israel, New Delhi



team consisting of Col. Yossef Rafaelov, Defence Attache; LTC. (Dr.) Eli Mozeson, Dy. Defence Attache; LTC. Tzur Shaham, Dy. Defence attachÉ; Alon Yehoshua, DSDE Rep (MALMAB) & Dy. Defence Attache of Diplomats of Embassy of Israel, New Delhi visited CSSTEAP on September 26, 2011. Dr. P. S. Roy, the then Director CSSTEAP welcomed and appraised about various CSSTEAP activities which included CSSTEAP objectives, academic courses and course participants, countries benefitted by CSSTEAP programmes, national and international linkages. During the discussion they suggested the possibility of collaboration between Israel and India in the field of training programme on Microwave and Hyper-spectral technology and application. It was also suggested that faculty exchange in the field of space technology and application would be very useful for both the countries.





International Linkages

4. Visit of Diplomats of Embassy of Indonesia, New Delhi



team led by H.E Lt. Gen (Retd.) Andi Muhammad Ghalib, Ambassador of the Republic of Indonesia, Mrs. Andi Murniati; Dr. Eng. Son Kuswadi, Education Attache and Dr. Leonard Flex Hutabarat, Counselor (Politic) of Embassy of Indonesia, New Delhi visited CSSTEAP on April 4, 2012. Director, CSSTEAP appraised on activities of IIRS and CSSTEAP, academic programmes, course participants, and the beneficiaries from Indonesia in particular. The delegation was also apprised off about the educational and research activities of IIRS and the Indonesian participants in particular benefitted from the IIRS courses. During the discussion Director CSSTEAP mentioned about the declining trend in the participation from Indonesia in recent years in CSSTEAP courses. H.E Andi Muhammad Ghalib mentioned that it may be due to the lack of information/ communication in various universities and institutions about the announcement of CSSTEAP courses and suggested that Dr. Eng. Son Kuswadi, Education Attache should be the focal point for CSSTEAP henceforth. Mr. Son will facilitate dissemination of information to the various departments in Indonesia. In order to propagate the information about CSSTEAP, H.E invited Director, CSSTEAP to visit Indonesia and to hold one-day seminar during Joint Working Group on education workshop in Indonesia which will benefit institutions/universities greatly. H.E also suggested that faculty exchange in the field of space technology and application would be very useful for both the countries.

5. Visit of Hon. Minister of State, Ministry of Public Administration, Bangladesh



Honorable Minister of State Ms. Ismat Ara Sadique, Ministry of Public Administration, Government of Bangladesh visited IIRS campus on May 6, 2015. She was accompanied by Mr. Md. Abdul Halim, Director General Prime Minister's office Bangladesh and Mr. Md. Shahriar Kader Siddiky, Deputy Secretary and Mr. Dr. Abdul Hamid, Deputy Secretary, Foreign Training branch, Ministry of Public Administration, Bangladesh. Dr. A.P. Singh Associate Professor and Dr. M.K. Bhandari, National Centre for Good Governance, Lal Bahadur Shastri Academy of Administration, Mussorie India were also with her. The objective of their visit was to look at the capacity building programmes of IIRS and CSSTEAP and to discuss future areas of collaboration in capacity building in the area of space science and technology. She was apprised about the activities and educational programme of IIRS and CSSTEAP. Her Excellency in her remarks appreciated the excellent capacity building programmes of the CSSTEAP and IIRS in the areas of Space Science and Technology in Asia Pacific region. In order to facilitate and enhance the future collaboration between IIRS and CSSTEAP, Hon. Minister identified Deputy Secretary, Foreign Training branch, Ministry of Public Administration, Government of Bangladesh as the nodal officer to liaison with different ministries, department, universities, libraries, etc. in Bangladesh to nominate officials to take benefit of the IIRS and CSSTEAP programmes.



International Linkages

6. Visit of Chinese Delegation from Beihang University/ CNSA

As a follow-up of the memorandum of understanding (MoU) on 2015-2020 Space Cooperation signed between Indian Space Research Organisation (ISRO), Government of India and Chinese National Space Administration (CNSA) on May 15, 2015, a delegation from CNSA and Beihang University China, visited Indian Institute of Remote Sensing (IIRS) during January 4-5, 2016. The visit was part of the Theme 4: Cooperation on Education and Training of the said MoU and to discuss on the potential cooperation between IIRS and Beihang University. The Foreign delegation included Ms. Jiang Hui, Director, International Space Cooperation, CNSA; Ms. Wang Fang, Department of System Engineering, CNSA; Mr. Weng Jingnong, Dean International School Beihang University, Executive Director of RCSSTEAP and Director APSCO, Education and Training Centre, China; Mr. Gao Guozhu, Attorney Law, The Law School of Beihang University and legal Expert for RCSSTEAP, China; and Ms. Guo Yuanyuan, Program Director of RCSSTEAP, International School of Beihang, University and Deputy Director APSCO, Education and Training Centre, China.

The objective of the meeting was to discuss and identify the areas of mutual cooperation between IIRS and Beihang University for capacity building initiative taken up by ISRO and CNSA in space science and technology. During two days meeting, detailed presentations were made on various courses long term & short term with sharing the experience including feedback. This was followed by discussions on different aspects of expertise and cooperation such as sharing experience of capacity building between two premier regional and reputed organizations, training and exchange of experts in the field of

space sciences, space technology and applications and enhancing the communication on the curriculum of different programmes organized by both sides. Ms. Jiang Hui, Director International Cooperation, CNSA gave her opening remarks and highlighted about the CNSA and its different programmes and objective their visit. Prof. Weng Jingnong Deputy Director RCSSTEAP and Director APSCO appreciated long service provided by IIRS in capacity building in five areas of space science technology and applications, performance of CSSTEAP and contributions made by IIRS and ISRO. Dr. A. Senthil Kumar, Director IIRS and Director, CSSTEAP briefed the delegation on India's Space Programmes and activities of ISRO highlighting different types of launch vehicles, Earth Observation and Communications satellites, interplanetary missions like Moon and Mars missions, navigation satellites (IRNSS, GAGAN), etc. He also highlighted the countries with whom ISRO's commercial success through Antrix Corporation globally. The points agreed upon after the discussions for the future collaboration between IIRS, ISRO and Beihang University included Resources Sharing, Publicity of e-learning and DLP programmes through websites and Exchange of Students, Faculty/Scientists.





International Linkages

7. Visit of Australian Consul-General to South India



Two member delegation consisting of Mr. Sean Kelly, Consul-General to Southern India and Ms. Sophie Anne Craig, Consul from the office of Australian Consulate General, Chennai visited Indian Institute of Remote Sensing (IIRS), Indian Space Research Organisation (ISRO) and Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP) on February 23, 2016. The objective of the visit was to discuss and identify the potential areas of mutual cooperation for capacity building and research initiatives between ISRO, Government of India and Government of Australia in the areas of space science and technology. Dr. A. Senthil Kumar, Director, IIRS & CSSTEAP highlighted about the Capacity Building activities of IIRS and CSSTEAP in Space Science and Technology. He also mentioned that ISRO has used Australian field data for calibration of RISAT-1 data and are aware of crop productivity and florescence studies being done in Australia.

Mr. Sean Kelly, Australian Consul-General interacted with course participants of RSGIS from different countries. He briefed about the Australian Space Programme and mentioned that Australia is among the leading countries in the world in Space Programme and stressed

about issues of Space Security, Space debris and collision between satellites, environmental monitoring, etc. He also informed about the New Colombo Plan for the students of member countries, particularly Australia and India. He informed that Australian Space Scientist Prof. Brian Schmidt who was 2011 Nobel Laureate in Physics is now the Vice Chancellor of Australian National University. He also mentioned about the supersonic and super-computing facilities in Queensland University. He also informed that Australian Prime Minister's has announced National Innovation and Science Agenda and informed about the International Science Congress in Adelaide in 2017 for partnerships with industry and space agencies to set up space science industry to study solar systems. He said these programmes will help India and Australia to science exchange programmes under New Colombo plan. He informed that Ms. Sophie Anne Craig, Consul will be the lead in space cooperation programme. The points agreed upon after the discussions for the future collaboration included Resources Sharing, Conducting Joint research programme, Publicity of e-learning and DLP programmes through websites, study-tours, and Exchange of Students, Faculty/Scientists.



Alumni Feedback

A. CSSTEAP Alumni Meets

Based on the recommendations of CSSTEAP Governing Board to obtain more concrete feedback from the alumni of CSSTEAP, it was considered to organize alumni meets in the South-East Asia Pacific countries. This is be useful to obtain first hand feedback and understand the alumni role in promoting space science and technology in their home countries. The objective of the meet is the reunion of alumni and the Centre and to know experiences about their achievements and how the Centre helped them in grooming their professional research career. CSSTEAP has so far organized successfully four Alumni meet in Nepal (October, 2010), Bangladesh (June 2011), Sri Lanka (October 2011), Bhutan (November 2011), Myanmar (March, 2012).

So far, about 1600 participants have been benefitted from CSSTEAP academic programmes. The alumni meet brings together students of different courses from the same country on common platform and facilitate the centre to know about their achievements and how the Centre helped them in grooming their professional research career.

The major observations and recommendations from all meets were:

- The CSSTEAP courses were useful in career development and improving profession aptitude in their organizations/institutions;
- CSSTEAP alumni have taken lead role as team leader and are assigned important projects to handle based on the PG diploma / M.Tech degree obtained from CSSTEAP.



Alumni meet at Nay Pyi Taw, Myanmar on March 22, 2012



Alumni Feedback

- Routine jobs on return does not allow students to pursue M.Tech research.
- Alumni suggested to provide more opportunity in offering fellowships for pursuing M.Tech research work at CSSTEAP and to organize refresher courses in emerging applications
- CSSTEAP to organize special short courses jointly with institutions in their country on Microwave Remote Sensing, Disaster Risk Reduction; short-range forecasts; Monsoon variability; Hazard & risk analysis in their country so that more participants can take benefit of the programme. The home institutions agreed to provide facilities and local support.
- ISRO should provide free access to the satellite datasets in different resolution in the event of disaster like cyclone, floods, forest fire etc.



Alumni meet at Kathmandu, Nepal on October 6, 2010



Meeting with the CSSTEAP alumni in Colombo, Sri Lanka on October 21, 2011



CSSTEAP Alumni Meet in Thimpu, Bhutan on November 15, 2011



Alumni Feedback

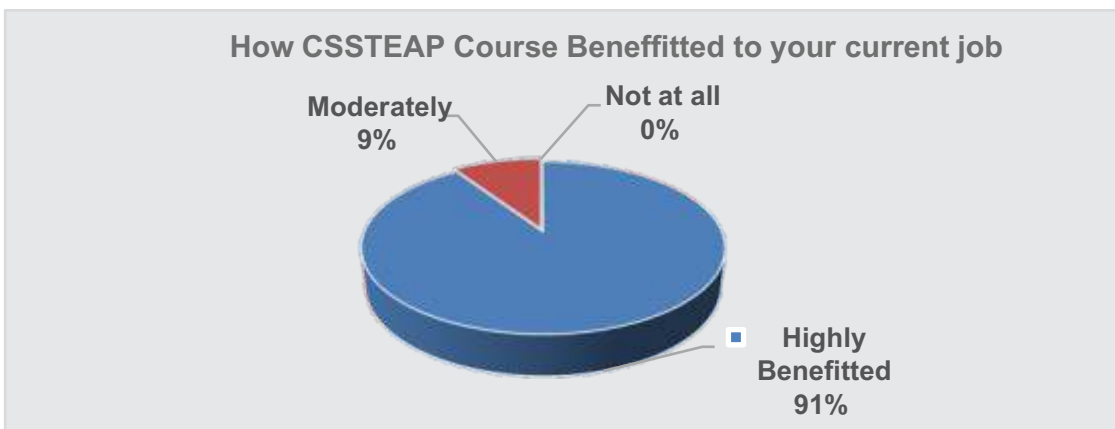
B. A. Feedback from Questionnaire received from Alumni



feedback questionnaire was sent to about 260 Alumni (statistics is shown in fig), who have passed out of PG Diploma courses during the year 2010 to 2015 consisting of following questions:

- Your current organization
- How CSSTEAP course benefitted to your current job
- Do you need any refresher course at CSSTEAP
- Any other Comment/ Suggestion

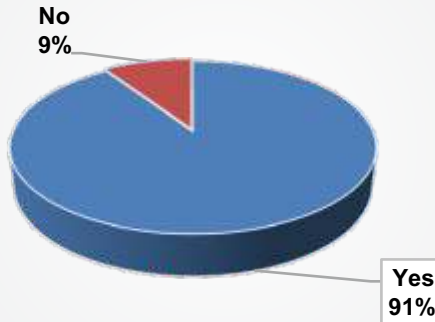
We have received response from 64 alumni.





Alumni Feedback

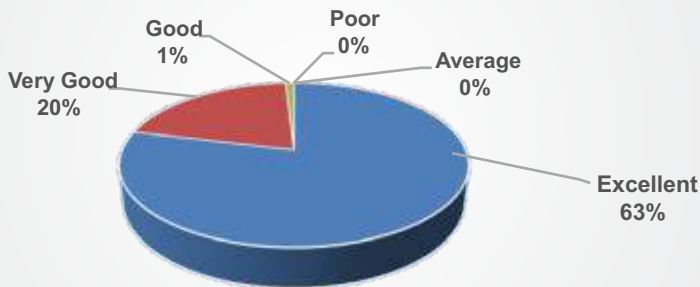
Do you need any Refresher Course



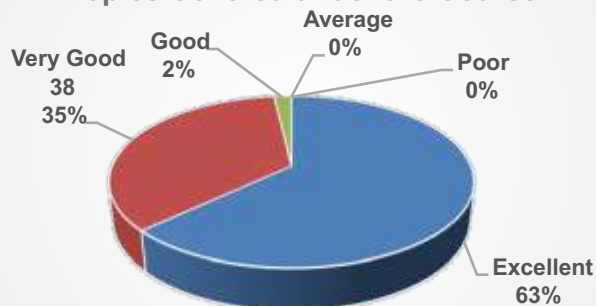
Most of the respondents has suggested that a Ph.D programme should be introduced. Also some of them asked for dataset available at MOSDAC website.

Analysis of Feedback given by participants -RS&GIS-PG Course

Overall Objective of the Course Achieved



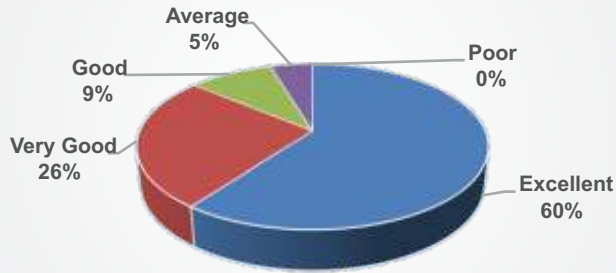
Topics Covered under the Course



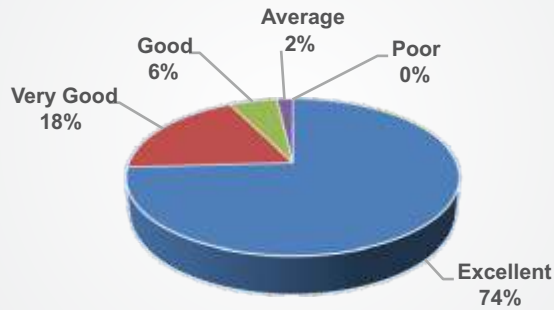


Alumni Feedback

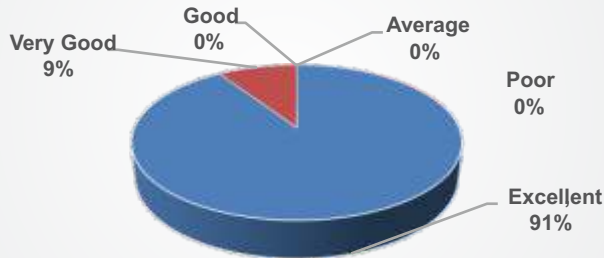
Was Reading Material Useful



Relevance of the Pilot Project



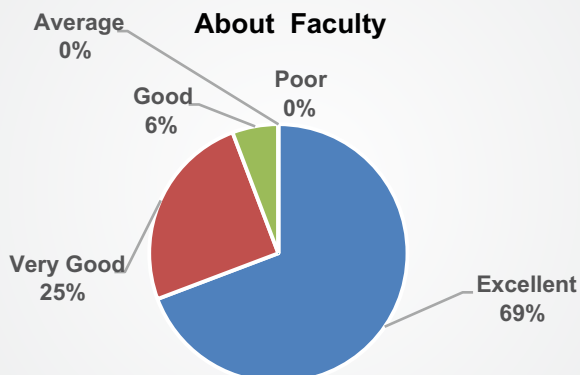
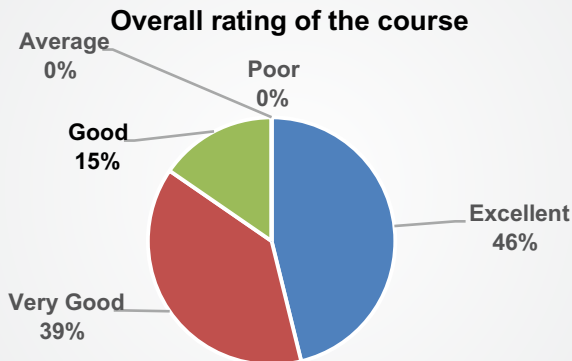
Physical Facilities (Class Room, Computer Room and Lodging)





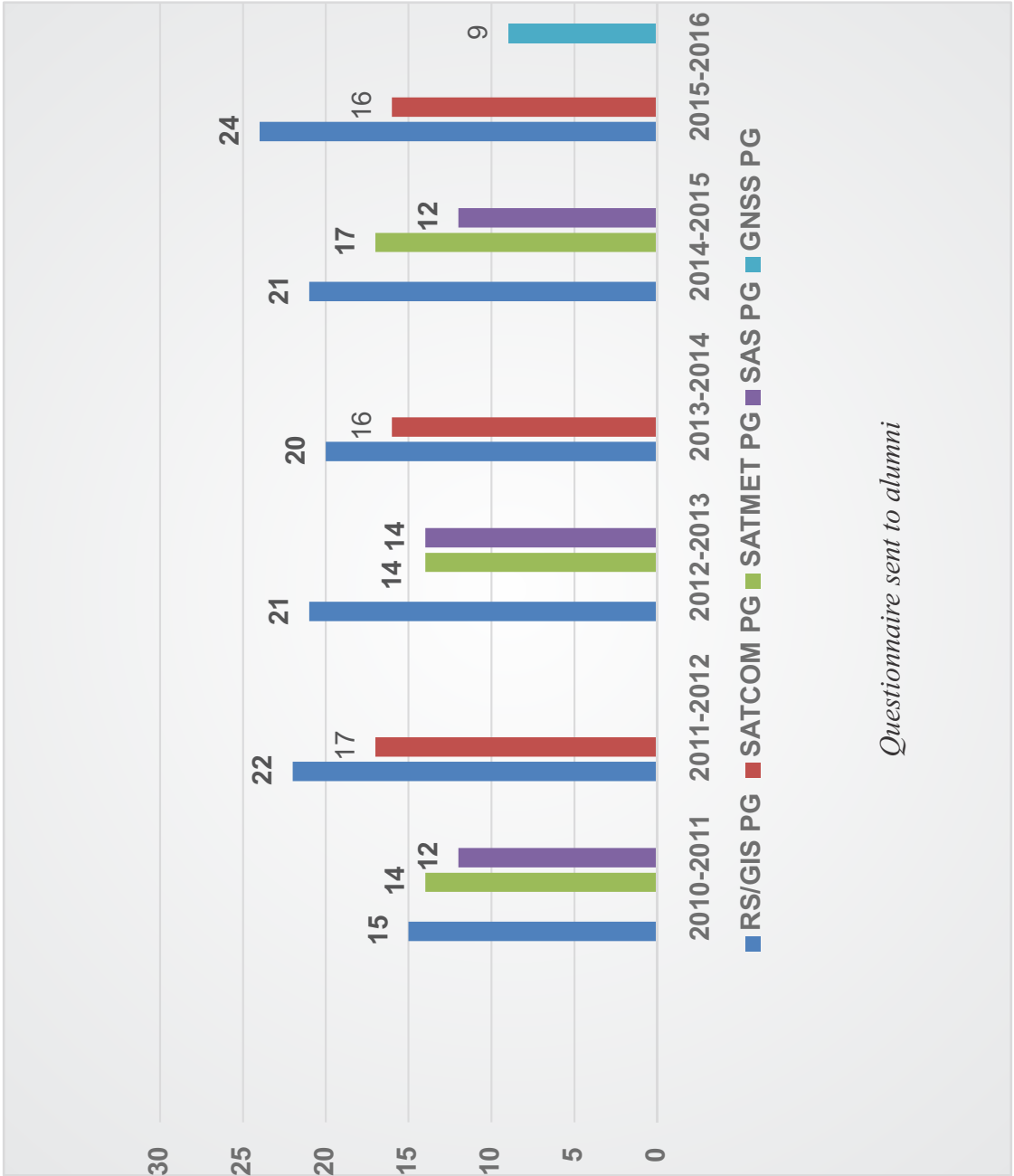
Alumni Feedback

SATCOM & GNSS





Alumni Feedback



Questionnaire sent to alumni



Evaluation of Centre's performance



The Governing Body is providing continued support and direction to position CSSTEAP as a Centre of Excellence in the Asia Pacific region.

The advisory committee has given an edge to CSSTEAP in contemplating of capacity building programmes in the emerging areas of space technology and its applications. The support from the major centers of ISRO/DOS and other Institutions to obtain access to the best technology and applications in the area of space science and technology. This has enhanced the capacity building and improved the quality of education and research in Asia Pacific region by focusing in prominent emerging areas of space technology through long-term regular courses on RS & GIS, SATCOM, SATMET and SAS.

The CSSTEAP has also introduced new discipline of space technology in their training and research programme. The introduction of the PG course on Global Navigation and Satellite Systems (GNSS) and Short Course on Small Satellite Missions (SSM) and Navigation and Satellite Positioning Systems (NAVSAT) courses are some of the important initiatives towards widening the horizon for CSSTEAP. The UN Agencies are also coming forward to collaborate and participate in the training programme of CSSTEAP. Special courses on disaster management support were conducted recently in collaboration with UN-SPIDER, UN-ESCAP, and IWMI. Several alumni of CSSTEAP are being benefitted in getting promoted and have been elevated to higher positions from the exposure through the skills developed in the courses pursued. Many of them have been assigned the responsibility of team leadership for important projects in their respective countries.

Following are some of the major performance outcomes:

- With the efforts made, Islamic Republic of Iran signed agreement to be one of the member countries in the CSSTEAP Governing Board on April 2012.
- Towards running the courses, centre had played a major role in developing & updating course curricula in view of recent advances in the disciplines in 1996, 2001, 2007 and 2012. These has been endorsed by UN and has been implemented by other UN centres across other regions as well.
- CSSTEAP had shared its experience with newly established Regional Centres in Jordan and China.
- Centre develops exhaustive lecture notes, course & reading material, practical/lab assignments and instrumentation, demonstrations which are shared/provided to students and organizations.
- Centre provides advice/guidance to the students in satellite data & software. Centre also provides support in terms of fellowship to few scholars to come to India and work in advance research work (M.Tech) in all disciplines.
- In order to cater the needs of different organizations and line departments from each country of the region, Centre has established to create databases of major organizations. Centre with the help of Governing Board members are in process of identifying focal points from each country to help in this regard and which would be a single window system in understanding country's



Evaluation of Centre's performance

requirement. This would help while selecting and admitting the students. Centre also sends its course brochures to different organizations, GB, AC, professionals, alumni in each countries.

- To obtain feedback & role in promoting space science & technology in their home countries, Centre had organized alumni meets as a reunion of alumni, professional organizations, ministries & CSSTEAP to review experiences about their achievements & how Centre helped them in grooming their professional career.
- In order to increase outreach of CSSTEAP courses and include Pacific island countries in centres activities, Centre with help of UNESCAP held special short courses for pacific island countries.
- With the effort taken by centre, there has been a gradual improvement in the intake of the student in Space and Atmospheric Sciences wherein the number of participants has now increased in recent years.
- In recent years, from 2012 onwards Centre had introduced new courses on Space Technology. The recent introduction of the short course on Small Satellite Missions (SSM) and Navigation and Satellite Positioning System (NAVSAT) which is upgraded to PG course on Global Navigation and Satellite Systems (GNSS) are some of the important initiatives towards widening the horizon for CSSTEAP. Also special courses in disaster management support in collaboration with UN-SPIDER/UNESCAP & IWMI have been conducted and participants of these courses were at senior level in their respective countries.



- During the Nepal earthquake disaster in April 2015, a customized mobile app using geoportal application was developed in Bhuvan platform and shared with alumni from Nepal for their participation.

Future Plans and Recommendations:

- To continue the present P.G Diploma & short courses courses indisciplines on space science technology & applications;
- to continue to support M.Tech research scholarship and need based for PhD. research on a specific request from AP countries;
- EDUSAT like distance education programmes should be taken up by CSSTEAP and GB member countries. Necessary support and infrastructure need to be made available by the respective country. The details is mentioned in Annexure-1;
- CSSTEAP will develop international linkages with institutions like GEO, GEOSS, WMO, UNEP, etc; and
- Continued efforts need to be made to include more members in CSSTEAP GB.



National Advisory Council

Based on the analysis of participation of students from different countries, it is realized that there is a strong need of a National Advisory Council (NAC) to be established in different countries.

Each country may set up a National Advisory Council (NAC) for CSSTEAP. The NAC should have representation from

- Departments who can be benefited from the use of space application for their developmental work
- R&D organizations who are engaged in developing technology/ applications to apply space inputs for practical applications.
- Higher educational institutions in the area of science and technology
- The council shall be chaired by a senior functionary of an organization in the country, which has mandate to promote development and application of space science and technology, to assist in all round development of the nation.

The NAC should have the mandate from the respective government, to co-ordinate the activities related to CSSTEAP within their country and funds should be allocated to this institution for this purpose. Such an organizational structure also signifies the commitment of member countries at government level towards the activities of the regional centres.

Among other things, the NAC could contribute to the following:

- To identify their nation specific training needs and the thrust areas that need immediate attention.

- Set up a mechanism for selection of trainees in their country (from different organizations) and recommend/forward their applications to CSSTEAP to undergo training programme (PG and short courses).
- Ensure the candidates selected by CSSTEAP are given intense training in English language (wherever required).
- Identify developmental issues of that country and formulate pilot projects, to demonstrate the effectiveness of input from space.
- Ensure that the scholars, when returned are given adequate support/facility to conduct one year project work.
- To work with CSSTEAP in evaluation of research thesis.
- Monitor how persons trained at CSSTEAP are utilized and give a feedback to CSSTEAP for corrective action if any.
- To build data base of institutions in each member country involved in using space input to support various developmental activities.
- To generate a directory of experts in their country in various fields of space' science and technology.

NAC may organize alumni meet once in two years, along with their department functionaries to assess how effectively the training could be put to practical use and give feedback to CSSTEAP. (This could be in the form of a national seminar on space applications).



IIRS Outreach Programme - Live & Interactive e-learning

Distance learning program of Indian Institute of Remote Sensing (IIRS) was initiated in year 2007 with the participation of twelve universities in India. Till December 2015, IIRS has successfully conducted 17 programs through live and interactive classroom mode (also known as EDUSAT programme) and also launched five online courses under e-learning programme. Under this programme, the initial focus was to use EDUSAT/INSAT 4CR satellite of ISRO for training and capacity building in distance learning by targeting students of Indian universities and academia to enhance their knowledge in Remote Sensing and Geospatial technologies. Further, the connectivity with user segment was extended by using Internet and broadband technologies

and linking more professional and user departments and ministries in the country to develop their skills in geospatial technologies. The present distance learning programme of IIRS is being conducted through following two major modes:

- Live and Interactive classroom sessions and
- E-learning based online courses.

The live and interactive mode of distance learning is through Internet and A-view software platform developed by Amrita e-learning Lab in collaboration with Ministry of Human Resource Development (MHRD) Government of India. The live classroom sessions are being conducted during 4:00 PM to 5:30 PM on daily basis through state of art studio facility setup in the Institute.



Studio of IIRS Distance Learning Center



IIRS Outreach Programme - Live & Interactive e-learning

IIRS has setup a state-of-art studio facility and control room to broadcast live and interactive classroom sessions and practical demonstrations through its Distance Learning Center. The high definition video quality can be broadcast to its user for better quality transmission.



Control room of IIRS Distance Learning Center

Further to enhance the outreach of geo-spatial science and technology, IIRS has developed e-learning contents and Learning Management Systems (LMS) for different certificate courses in Remote Sensing and geo-spatial technology (<http://elearning.iirs.gov.in>). The e-learning courses are self-paced and learner centric courses. The syllabus of the courses are as per latest developments and trends in geo-spatial science and technologies with specific focus on

Indian case studies for geo-spatial applications. The learning is made available through interactive 2D and 3D animations, audio, video for practical demonstrations, software operations with free data applications. The learning methods are implemented to make it more interactive and learner centric application with practical examples of real world problems.



Reception of programme at student's end





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