

7<sup>th</sup> IAA Planetary Defense Conference – PDC 2021  
26-30 April 2021, Vienna, Austria

Session : 12 ; Disaster Management  
Topic : Public Education and Communication

IAA-PDC-21- Venkataramaiah – Jagannatha-12-04-fm.pdf

## CLIMATE RESILIENT PLANETARY DEFENCE – A CASE STUDY OF COST FREE MODELS

Jagannatha Venkataramaiah <sup>1</sup>

<sup>1</sup>Ph.D. Scholar, Civil Engg Dept, JAIN (Deemed-to-be-University), Bengaluru,  
Alumni, International Space University, Strasbourg, France

Postal Address:

“Panya Sadana”, 173, 3<sup>rd</sup> A Main, D Block, Vijayanagar 3rd stage, Mysuru 570030  
India

e mail :jagsiobbindia@gmail.com

MANUSCRIPT OF 7PDC ACCEPTED E-POSTER No. 57

### ABSTRACT

*Climate resilient lifestyle is Planetary Defence. The purpose of this research is to validate and report cost free four non formal community enabling models of education. Participation as a key to sustainability vindicated.. Planetary threats by external/internal could be lived through mindfulness and life style activities by students and family.*

Keywords : Space for enabling, Space Eco Literacy, Non Formal, Zero Cost Learning, Climate Resilient, Planetary threat.

#### 1.0 Background

A continuous space quest in human endeavors as an asset for any threats is important today. Evolution of Scientific and philosophical perspectives during 600 BC to 2000 AD provide adequate evidence for this[1]. It could be summarized as in Greek science, dialectic method::discovery by question and answer, Socrates, 470 BC. Later for 800 years, the dark age could emerge as preservation and translation of Greek Science only by 1000 AD, Avicenna, 980 AD. The next significant development could be seen as heliocentric , Earth as not centre of universe, Copernicus, 1473 AD. Further, foundation of modern astronomy and telescope invention could go beyond state and authority., Galileo, 1564. The scientific revolution of next three century provided a boost to Space Sciences. Rockets could projectile 1000m range with 3 to 6 kg black powder in war and defense, around 1200 AD. In this period identification of planetary motion was the shot in the arm for space age, Kepler,1571 AD. Newton, 1643 AD could contribute principles of

experimentation. Later, the present generation has been a witness since 1960 for unique developments. Yuri Gagarin, 1961, first successful space travel, Neil Armstrong 1969 first step of man on moon have taken mankind to a frog leap in Space quest. Formal space education also did not fall behind. International Space University, 1988 till date could get over 5000 trained man power in 110 countries. This was with three "I"s of ISU namely, Interdisciplinary, International and Intercultural. Casandra, a summer school report of 2005[2] at ISU is about managing Near Earth Objects. It is found very significant for Space Quest Students learning.

Important tracing of converging effort for excellence have also reinforced sustaining Space for Humanity [3]. Counter Space Time line [4] since 1960 has been cumulative and qualitative in house threat of mutually assured disruption and potential irreversible impacts. The source is known but the secure space for all wanting. Engaging Civic Societies and Future Generation for enabling Secure Space for all is the need of Space Education Outreach.

It is this background a focus on the Community enabling future of mankind in space is relevant. Rightly, the vision of Indian space ethics stand out. Quote "The future of mankind is determined by the socio cultural imperatives rather than science and technology alone" Prof Satish Dhawan, Former Chairman ISRO" unquote. Thus, the planetary defense need to be appreciated from space quest and capability accrued and emerging from human conscience. Enabling community to take care their only home is absolutely a historical responsibility. Climate resilient life style of communities without borders and socio political barriers since ages is an invaluable and cost free asset.

## 1.0 Literature Survey

Planetary threats are both external and internal. Present ecological niche of mankind can also be considered as an inertial status. This can mar or make human security on the only home, the TERRA. Evidences reveal that during 1875 to 1975, human population trebled but the primary energy consumption increased by thirty two times.. Later, the exponential growth of human population and wealth amassing has put irreversible losses in habitation, biodiversity and livelihood of majority of people.. Earth Day Network [5], since 1972 could converge millions of American for a vision for a safe and secure Earth.. Quote "What is the use of a beautiful home, if we do not have a decent planet to put it on- Sir Henry David Thoreau" Unquote. By 2000 over 5000 groups in 184 countries voiced for a mindfulness strategy to prevent further irreversible impacts. Complacency or avoidance or negligence on Climate change became no more valid. Space as an unbiased eye in the sky dispelled all distractions by quantifying irreversible global consequences. The Climate Change did wake up global action to respond in a multipronged preventive agenda and action plan most relevant to planetary protection..

Earlier, towards the end of last century, earth security concern had been consolidated by 1000s of committed and wise professionals. This good development took place at intergovernmental, academic and research at the UN platform. This culminated as UNCED 1992 after decades of sustained efforts. An important handpost called the Earth Summit in 1992 was the net outcome.. The concept of Sustainable Development evolved[6] Quote "Sustainable Development: while

meeting the present generation requirements will not deny the legitimate needs of the future generation + Agenda 21” Unquote.. Now, over 1 Billion people with almost every 6<sup>th</sup> person the planet in 193 countries are involved in Climate Action .. It could be for climate adaptation in life styles to corporate commitments and targets. Together, since later part of last century space age emerged to lead climate action. This was by sustained deployment of communication prowess and geospatial data applications.

Three other issues of relevance to planetary defense are firstly, Disaster Risk Reduction DRR, technological undoing as Pandemic and related Infodemic and lastly Counter Space. All these are driving capability and assets for community enabling to care for their planetary defense. Some of the best practices in disaster risk reduction are available. As an example,, UN ISDR[7] Lessons for community security is an asset for Planetary Defence. The following take homes are available as few benefits . 1) Policy Direction and Operational capabilities in areas of governance and Civil Society.2) Specific Training Materials to Schools. 3) Facilitate increased coordination and 4) information sharing between agencies working in the field of disaster risk management. Sendai Frame work and International Cooperation in Space for Disaster Management have been in position. Design and installation of a monitoring and early warning system has significantly reduced the impacts and loss of life.

### 3.0 Materials and Methods

An important development in community enabling could be seen in UNESCO conferences since 1970s. One significant has been the first Intergovernmental conference on Environmental Education, Tbilisi declaration 1977[8]. The objectives of Environmental Education were explicitly stated as facilitating attitude, awareness, knowledge and participation to Individual and community as sufficient to enable them to live through .natural or manmade disasters. Delegates from 66 member states and observers from two non-member states participated. Representatives and observers from eight U.N. agencies and programs also participated. Three other intergovernmental organizations and 20 international nongovernmental organizations also were represented. In all, 265 delegates and 65 representatives and observers took part in the conference. Enormous potential of Non Formal Education has been well recognized in Successive UNESCO conference deliberations[9]

The Tbilisi Declaration was adopted by acclamation at the close of the intergovernmental conference. The declaration noted the unanimous accord in the important role of environmental education in the preservation and improvement of the world's environment, as well as in the sound and balanced development of the world's communities.

Climate Resilient Planetary Defence activities can be clustered around the community enabling since the Earth Summit 1990s. In most of the cases Space technology is deployed to the optimal levels. Natural and Community based solutions for climate change have been identified, researched and analyzed. Few case studies of agrarian and urban across continents are available at a number of global agencies.. International Institute for Environment and Development, IIED UK research contributions are great assets [10]. In the domain of Disaster Management ED-DAT, 1988 is very important. Systematic documentation of natural and

technological disasters are available[11]. Tracing disasters from 1900 till recently on weekly basis[ However, the significant community based resilient response are seen at UNISDR. Community enabling to care for their security are good lessons for planetary defense. In the recent lockdown Infodemic management by WHO is a significant application of Space technology for enabling community to care for their health [12] .

Specific actions are suggested by a classical work Caring for the Earth : A strategy for Sustainable Living IUCN/UNEP/WWF,1991[13]. They are eight action points listed. Action 01 : Provide communities and individuals with access to resources and an equitable share in managing them. Action 02:Improve exchange of information, skills, and technologies. Action 03: Enhance participation in conservation and development. Action 04: Develop more effective local governments. Action 05: Care for the local environment in every community. Action 06: Provide financial and technical support to community environmental action.. Action 02 : Improve exchange of Information, skills, and technologies are considered for development of cost free community enabling four eco models focused in this paper.

Role of Informal and Non Formal Education has been vouched well by UNESCO prior to Agenda 21, However, Agenda 21 gave a definite affirmation by a Vision, Agenda and Action Plan. Time targets and financial aspects were also unveiled. These were very crucial for Community enabling for security and enabling for planetary threats. . Agenda 21, Chapter 36, UNCED,1992[14] focus on the Promoting Education, Public Awareness And Training :At section k. Specifies, Countries should facilitate and promote non-formal education activities at the local, regional and national levels by cooperating with and supporting the efforts of non-formal educators and other community-based organizations. The appropriate bodies of the United Nations system in cooperation with non-governmental organizations should encourage the development of an international network for the achievement of global educational aims. Further, at the national and local levels, public and scholastic forums should discuss environmental and development issues, and suggest sustainable alternatives to policy makers;

In the present context of planetary protection, Indian Popular Science and Non Formal education is very relevant . In the recent decades, Bharath Jana Vigyan Jatha, BJVJ, 1987 remain a watershed in People Science Movement in India. One significant development in the recent decades has been in 1980s. From October 2nd to Nov to 7th 1987. 26 organizations under All India Peoples Science Network conducted a major campaign in science communication aimed at promoting a better understanding of the methods and values of science and the contribution it can make to human progress. BJVJ consisted of 5 zonal Jathas or mobile groups of scientists, teachers, artists and PSM activists who travelled over 25,000 Kms, held performers at over 500 locations and converged at Bhopal in a rally of over 4000 scientists, teachers and activists on November 7,1987. In addition to these Jathas, extensive local programmes were organized [15].

KRVP Karanataka Rajya Vigyan Parishat, recipient of first National Council for Science and Technology Communication, Govt India National Award for popularizing science is working for over 3 decades with many science related activities sponsored by Govt of India and Govt of Karnataka. Four models focused here have been

implemented under KRVP in 1988 and later three models through People Science Forum, a unit of KRVP. Space Technology and Social Application is a people science account of capturing over three decades of self-reliance saga of Space in India. The four Non Formal Zero Cost Ecological and Environmental and Space Eco literacy models are listed at People Science Forum.. A pioneering documentation of Popular Science Space Education Outreach publication are also available at PSF home page [16]

#### 4.0 Results and Discussions

Four Zero Cost Community Centered Space Eco Literacy Models are presented and discussed. These Zero Cost Non Formal education models planned, based on UNESCO/UNEP/IEEP, Tbilisi 1977 guidelines are employed. Contents, activity, design, planning, implementation and results are summarized.

Model : 1 : EESS : Ecological and Environmental Studies Students, 1988, Bengaluru, India.

A Team of Space Scientists from ISRO in 1987-88 create an Informal Environmental Education Model based on UNEP/UNESCO/IEEP, Tbilisi Conference Guidelines. It is one hour a week for 8 months on ecology and environmental studies. It involved scientists, community experts, interface by students which led to EESS model. About 120 joined for an open invitation and finally about 60 students embarked in a pre university and graduate women college at Bengaluru, India.

Over 60 students used one hour a week for eight months. EESS Model got cited as one of the best 20 Eco Education Guides by Earth Day Network 2000 and shared with 1500 organizations in 140 countries. This non formal education format cost free was presented at UNESCO, 1989 conference in Panaji Goa and later published in The Hindu, national News Paper, Education, 1992. Earth Day Network 2000 cited EESS as one of the best 20 Eco Education Guide model.

Summary of the EESS Model activity, methodology, resources, outputs, important learning, and compliance to UNESCO/UNEP/IEEP Tbilisi 1977 guidelines are at Table 1.1

Model 2. SELC : Community Eco Literacy in the Lake Environs, 2000-2019

Community Eco Literacy campaign on Sundays at the Kukkarahally Lake environs, Mysuru., India.

Over 2500 man-days converged voluntarily involving students, youth and citizen, It started basically to pick up plastic waste in the foreshores of Kukkarahally Lake and developed into an eco literacy campaign for the environs. Clean Up the World, Australia and UNEP recognized this cost free community voluntary activity efforts in 2003 and 2004.

Main Objective of Clean up the World was to bring together citizens from every corner of globe in a simple activity that positively assist their local environment -

Since 1993, Clean Up the World has motivated more than 40 million people each year to volunteer and make their environment a cleaner, healthier place to live.

Summary of the Model 2 SELC activity, methodology, resources, outputs, important learning, and compliance to UNESCO/UNEP/IEEP Tbilisi 1977 guidelines are at Table 1.2

#### 4.3 . Model 3 : SEL SF: Space Eco Literacy for Students with Family, 2011

Ten Sundays Space Eco literacy for 30 children and family were organized at Albert Einstein Auditorium, DOS in Physics, University of Mysore in 2011. Results were reported as a Technical Paper at COSPAR 2012 Scientific Assembly, Mysuru, India [17].

Summary of the SEL SF activity, methodology, resources, outputs, important learning, and compliance to UNESCO/UNEP/IEEP Tbilisi 1977 guidelines are at Table 1.3

#### 4.4. Model SEL SW : Space Eco Literacy Sky Watch Orientation, 2020

Upasaki Prof V M Parvathamma Memorial Virtual Space Eco Literacy and Sky Watch SEL SW Orientation Program April – Oct 20 got deployed as a virtual space eco literacy model in the Covid19 Lockdown 2020.

Over 60 nos of 5th to 9th Std Students were supported with a handhold. Pandemic Resilience was the theme of week two. One flier as a background note on COVID19 Resilience in Our Hands got translated to French, German, Spanish and Japanese and Indian languages. The English version of the flier is enclosed [18]. This flier was shared with WHO through its press briefing webinars. A sample output of a high school student on climate resilient life style is enclosed [19]. The weekly topics included Climate Action, Pandemic, Lakes, ISRO, ISS, ISU, Space Explorations, Astrobiology and Sky Watch.

Summary of the Model 4 SEL SW activity, methodology, resources, outputs, important learning, and compliance to UNESCO/UNEP/IEEP Tbilisi 1977 guidelines are at Table 1.4

#### 5.0 Inferences

Four Zero Cost Ecological and Environmental and Space Eco literacy models were implemented in Non- Formal mode and are sustainable. Rich Cultural Heritage embedded with space quest in the students and families proved to be assets. Creative expressions of children for their living environment and planet were evident in their responses. It is an indication for secure world civic sense. In spite of normal digital divide it was possible to involve the socially vulnerable students in the non formal mode of learning. In case of fourth model in virtual modes also creative responses could be achieved. A minimum e mail communication and a handhold support was found necessary. For hard pressed students and parents during

lockdown one hour a week was a flexible learning opportunity. The model can be replicated in any other languages with no financial implications.

## 6.0 References

- [1] Checkland, 1981, Systems Thinking and Systems Practice, <https://archive.org/details/systemsthinkings00chec>
- [2] Cassandra- A Strategy to protect our planet from Near Earth Objects, SSP 2005, <https://www.isunet.edu/>
- [3] Jean- Michel Contant, Space for Humanity, Celebrating 50 years of excellence, International Academy of Astronautics, 2010, <http://www.issweb.org>
- [4] Brian Weeden and Victoria Simon, April 21, Global Counter Space Capabilities, A Open Source Assessment, Secure World Foundation, <https://swfound.org/counterspace/>
- [5] Restore Earth, Earth Day Network, 2021 <https://www.earthday.org/>
- [6] UNCED 1992, <https://www.un.org/en/conferences/environment/rio1992>
- [7] UN/ISDR, Disaster Risk Reduction : 20 examples of Good Practice from Central Asia, [www.unisdr.org](http://www.unisdr.org)
- [8] UNEP/UNESCO/IEEP, 1977, Tbilisi declaration <https://www.unep.org/news-and-stories/video/intergovernmental-conference-environmental-education-tbilisi-1977>
- [9] Cheng Ki Ming, Leung Kam Fong, 1989, Popularization of Science and Technology, What Informal and Nonformula Education Can do ?, An International Conference Organized by Faculty at Education, University of Hong Kong in Co operation with UNESCO, Paris, Sep 4-9, 1989.
- [10] Nature Based Solutions <https://www.iied.org/nature-based-solutions-for-climate-change-global-ambition-local-action>
- [11] International Disaster Data Base <https://www.emdat.be/index.php>
- [12] Infodemic Management, <https://www.who.int/teams/risk-communication/epi-win-updates>
- [13] IUCN/UNEP/WWP, 1991, Caring for the Earth, A strategy for Sustainable Living, Gland, Switzerland.
- [14] Chapter 36, Agenda 21, Promoting Education and Public Awareness, <http://un-documents.net/a21-36.htm>
- [15] Parameswaran, M P, Bharath , Bharat Gyan Vigyan Samithi, Perspectives, Tasks., Achievements, Tasks... & Dreams, New Delhi, India, 1993
- [16] Our Elders Live in Us and Science is in Our Breath, People Science Forum, Unit off KRVP Mysuru, [www. Oeliusb.com](http://www.Oeliusb.com),, 2020
- [17] Jagannatha V, et al., 2012, Community Level Space Eco Literacy,: A Case of Popular Science, 39th COSPAR Scientific Assembly, 14-22 July 2012, Mysore, India, PE.11-0002-12
- [18] Pandemic : Resilience in our Hands, Week Two Background Note SEL SW, April 20, [www.oeliusob.com](http://www.oeliusob.com)
- [19] High School Student Response on Climate Change, Typical Out put of SEL SW 2000

## 7.0 Acknowledgement

In the planning, design and implementation of Four Education models since 1988  
Dr. Shobha J, Prof of Botany, University of Mysore, Mysuru, India,  
Er. Sahana J, MS2011, ISU & Zumba International Trainer, Bengaluru, India  
Dr. Spandana J, Student MS in General Surgery, New Delhi, India  
Ar. Sadhana J, Ph.D. Scholar, Environmental Psychology, UoS, UK

## Research Guides

Prof. A Shashishankar, Chairman, Civil Engg Dept, AMC College of Engineering, Bengaluru, India

Prof. Mohammad Inayathulla

Civil Engineering Dept, Bangalore University, India

## Mentors and Sr Colleagues

Prof Satish Dhawan, Formerly Chairman ISRO

Prof U R Rao, Formerly Chairman ISRO

Dr. A S Kiran Kumar, Formerly Chairman ISRO

Dr. K S Ganesh Raj, Manager, RRSSC, NRSA, ISRO Bengaluru,India

Special gratitude to Prof. Michael Simpson, Former President ISU, who motivated the first author be a SHSP 2011 student at UoSA, Adelaide, Australia and become the first student of second generation at International Space University, at early 50s a decade ago. Special thanks also to Dr. Jean Michel Contant, Secretary General IAA who supported first Author participation at 6<sup>th</sup> PDC Maryland University, Washington DC, USA 2019.

## Students and Volunteers

in the development of EESS Model 1988 at MCC Bengaluru , Community Eco Literacy over 350 Sundays from 2000 at Kukkarahally Lake Mysuru, Ten Sundays Family Space Eco Literacy at University of Mysuru, 2011, along with Young Students 5 to 9 Std with a handhold in Space Eco Literacy and Sky Watch Orientation Program March – Oct 2020 : Virtual Model : LOCKDOWN

## 7,0 Annexures

7.1 Table 1 EESS : Ecological and Environmental Studies by Students 1987-88

7.2 Table 2 SELC : Community Eco Literacy in the Lake Environs, 2000-2019

7.3 Table 3 . SEL SF: Space Eco Literacy for Students with Family, 2011

7.4 Table 4. SEL SW : Space Eco Literacy Sky Watch Orientation, 2020

7.5/6 Week # 02 of 10 SEL SW : Pandemic Resilience in Our Hands page 01/02

7.7 Space eco literacy response from a high school student on Climate Change