COMPENDIUM ON INNOVATIVE TOOLS FOR DRR- IDDR WAY FORWARD

Innovation Challenge for DRR

International Day for Disaster Reduction 2017

Assam State Disaster Management Authority
Government of Assam
Dispur

Rajesh Prasad
Commissioner & Secretary, Govt. of Assam
Chief Executive Officer
Assam State Disaster Management Authority

FOREWORD

Innovations can play a significant role in dovetailing Disaster Risk Reduction (DRR) into development practices. Technological innovations have always been present in India, but its application in DRR has been differential. Globally significant hotspots of disasters and economic development have emerged, in which the application of science and technology in DRR has become an essential requirement for informed decision making. The more recent Sendai Framework for DRR 2015–2030 recognizes the importance of technology in all of its priority action areas. Grass-root innovations can also be cost-effective solutions for dealing with localized hazards.

Disaster management Authority, Assam has tried to collate few innovative solutions across Assam through a competition organized on 13th of October, 2017 at the State level, on the occasion of International day for Disaster Reduction (IDDR). This compendium is a compilation of all the solutions received from the participating individuals, agencies and academic institutions. The compendium will be a useful source of information for all stakeholders involved in disaster reduction as well as communities in general.

Rajesh Prasad
Commissioner & Secretary, Govt. of Assam
Chief Executive Officer
Assam State Disaster Management Authority

Shri. Rajib Prakash Baruah, ACS
Additional Secretary& State Project Coordinator
Assam State Disaster Management Authority,

Acknowledgement

On the behalf of Assam State Disaster Management Authority (ASDMA), I would like to thank all participants for attending the workshop on "International Day for Disaster Reduction (IDDR)" on 13th October 2017 to achieve the global target of reducing exposure of communities to different Hazards. We hope that you found the workshop informative and worthwhile. Our primary goal was to increase your understanding of international, regional and national perspective on prevention, protection and reducing the number of people affected by disasters.

I congratulate all the winners and participants and urge everyone to motivate other people around them to think creatively and consistently seek solutions for societal problems so that an atmosphere of peace and harmony can be achieved.

Regards,

Shri Rajib Prakash Baruah, ACS
Additional Secretary& State Project Coordinator
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Dispur, Guwahati.

Compendium on Innovative tools for DRR- IDDR way forward

Science & Technology have been a significant pillar which supported various international initiatives for Disaster Risk Reduction. The Hyogo Framework for Action 2005–2015 as well as the Sendai Framework for DRR 2015–2030 recognized the importance of science and technology in all of its priority action areas. In all the subsequent global and regional forums, consultations and conferences, it has been reiterated that science and technology can go a long way in bringing about an effective solution to the existing disaster risks prevalent worldwide.

Hon'ble Prime Minister of India, Shri Narendra Modi in his inaugural speech in the Asian Ministerial Conference for DRR has also identified innovations as a key area for addressing the issues of DRR in the Country.

This booklet is an effort of Assam State Disaster Management Authority to compile all the innovations which were displayed at the Innovation Challenge held during the International Day for Disaster Reduction 2017

International Day for Disaster Reduction (IDDR), 2017

The United Nations General Assembly has designated 13th October as International Day for Disaster Reduction to promote a global culture of disaster reduction, including disaster prevention, mitigation and

preparedness. For 25 years, the International Day for Disaster Reduction (IDDR) has been a major global awareness event to recognize progress and encourage further efforts to build disaster resilient communities and nations. International Day for Disaster Reduction is an opportunity to acknowledge the substantial progress being made toward reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.

Assam State Disaster Management Authority (ASDMA) in association with UNICEF, Assam celebrated the International Day for Disaster Reduction (IDDR) on October 13, to achieve the global target of reducing exposure of communities to different Hazards and thereby reducing displacement during disasters in order to build a disaster resilient State. The observance

of the day started in 1989 with the approval by the United Nations General Assembly. The theme for 2017 was "**Safer Homes & Livelihood"**.

This target is focussed on prevention, protection and reducing the number of people affected by disasters. It concerns the safety of all but particularly those at greater risk of death, injury, ill-health, loss of livelihood, displacement and lack of access to basic services from disaster events including women and children, people living with disabilities, and older persons. These groups have varying degrees of exposure to disaster events and also need to be included in disaster risk management planning. The International Day's rallying cry implies all this but focuses on the primal importance of the family home as a sanctuary and safe refuge in times of disaster with a particular focus on preventing displacement.

The exhibition titled "Innovation Challenge for Disaster Risk Reduction" which was conducted on the occasion witnessed some unique innovation from various institutions and individuals from within and outside the state giving solutions for various hazards like Storm, Fire, Earthquake and Flood. Over 200 students from various schools also visited the exhibition.

Innovation

Applied research is used to find solutions to everyday problems and innovative approaches to address the problem. Such research is extremely important for the field of disaster risk management, which looks at reducing the daily risk of communities facing disasters.

Innovation is the introduction of something new and relevant ideas and also profitable implementation of these ideas. There is no shortage of ideas and inventions in the world. The challenge is to introduce it successfully to the people. Innovation can bring in significant change in the way we address the issue of disaster risk reduction. There are three components for innovations.

- A hardware component – consisting of material or physical aspects of innovation
- A software component – consisting of information base that is needed to use the innovation
- An evaluation information component – that is useful for decisions related to the adoption of the innovation.

These components form a system to make it user friendly. In the exhibition titled "Innovation Challenge for Disaster Risk Reduction" organised by ASDMA, the Innovations were judged on Creativity of the Concept, Applicability in Disaster Management, Technical Specification.

INNOVATION -1

INNOVATION NAME: LIFE SAVING CHUTE

Name of the Applicant/Organization/Institution/Firm/Start Up: Rameez Ahmad Dar and Suhail Ahmad Dar

PROBLEM

During any emergency situation like fire, attacks, etc., it is very difficult to evacuate people from buildings particularly tall buildings through windows by using ropes. It is also tough to come down to the ground floor using stairs or elevator.

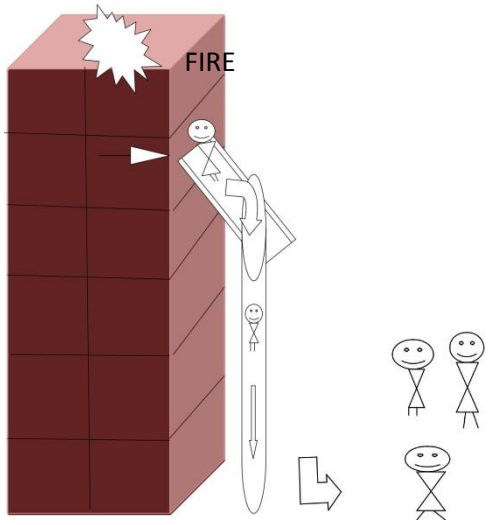
CORE TECHNICAL INNOVATION

A long hollow bag which is of cylindrical shape and is made from " Polyester (Polyethylene Terephthalene) and cotton " which has a great elasticity. Hence provides elasticity to this long bag or pipe. Bag is hanged/attached to the stand (made from iron, steel and aluminium) installed in the wall at the emergency exit door and runs up to the ground. At the ground, people slipping slowly through the bag, will land easily.

INNOVATION SUMMARY

The long, hollow and elastic bag or pipe is installed at any emergency exits of the building. The bag is hanged with the help of stand made in the building and flows down to the ground. At the time of emergency, people can enter inside the bag and can reach directly to the ground where they are rescued/supported by the people or experts. People, in these bags will get proper air to breathe and sufficient light as these are transparent. Bags are also slippery as it has been made from polyester as well.

WORKING DIAGRAM



STEP-1: An object/person dives into the cloth pipe at the initial stage.

STEP-2: An object/person inside the cloth pipe is provided external force to move downwards.

STEP-3: Finally the object/person comes out through the end opening

CONSUMER/TARGET AUDIENCE

Government authorities and Private property owners or anyone install this idea cum device in their buildings for the safety purposes.

IMPORTANCE OF INNOVATION

The efficiency of the idea is quite significant as it is cost efficient, easy to install, comfortable and hence easy evacuation is possible in less time and less efforts. It reduces the time in evacuation process. It is to be installed at once in a building and then it will be used at the time of emergency only. People, trapped inside the building during emergency situation, can come out of the place/building and save their lives. They don't have to wait for the ropes, elevators, well equipped vehicles, etc. and thus it minimizes their tension and lives get saved.

PROPOSED INNOVATION MEETS MAKE IN INDIA INITIATIVE

This is idegeneously made and can be used widely for the safety of the people. India is the producer of raw materials, technology and also market for the product.

DETAILS OF TEAM LEADER AND TEAM MEMBERS

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INNOVATION -2

INNOVATION NAME: FLOATING TOILETS IN FLOOD AFFECTED AREAS OF ASSAM

Name of the Applicant/Organization/Institution/Firm/Start Up: Dr Mridul Kumar Deka

PROBLEM

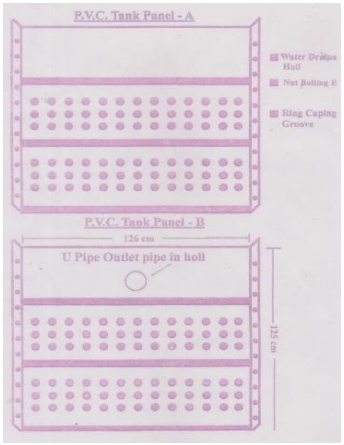
Portable and floating toilets play a significant role, and remains at core in developing a successful sanitation system during flood situation, or in any submerging area. The portable toilet, being an arrangement through which the excreta and waste is disposed/disposable at a safe place distant from the concerned local, unlike traditional ground toilets, reduces the probability of water contamination significantly. Likewise floating toilet is an available sanitary provision for the lowland populace.

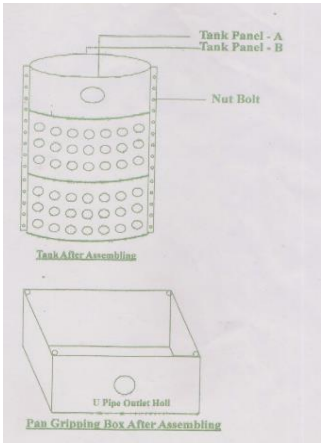
CORE TECHNICAL INNOVATION

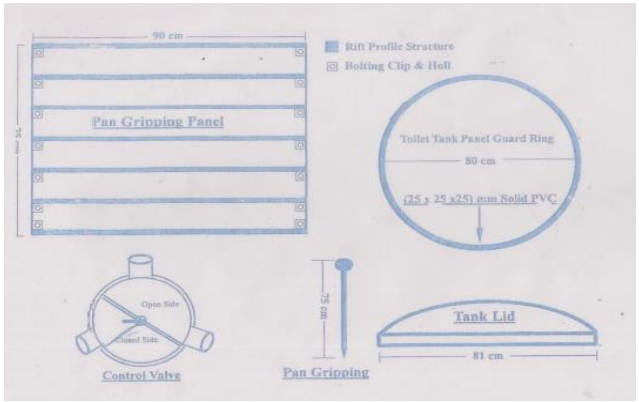
Fibre glass based floating toilets which are durable and reusable

INNOVATION SUMMARY

Fibre glass based floating toilets both at community and household level which can be anchored to the ground and will rise along with flood waters maintaining its structural integrity







CONSUMER/TARGET AUDIENCE

The consumer/target audience is Flood affected population of all age groups in any flood affected district.

IMPORTANCE OF INNOVATION

Portable and floating toilets play a significant role, and remains at core in developing a successful sanitation system during flood situation, or in any submerging area. The portable toilet, being an arrangement through which the excreta and waste is disposed/disposable at a safe place distant from the concerned local, unlike traditional ground toilets, reduces the probability of water contamination significantly. Likewise floating toilet is an available sanitary provision for the lowland populace. Fibre glass based floating toilets both at community and household level which can be anchored to the ground and will rise along with flood waters maintaining its structural integrity. These are durable and also reusable. These toilets are permanent and can be used for at least 30 years. They can be transported and assembled or dismantled easily. Also the capacity can be increased as the toilets are modular in nature. Optimal use of space for building sanitary toilets in flood affected areas and minimal environmental damage and contamination of surrounding areas

PROPOSED INNOVATION MEETS MAKE IN INDIA INITIATIVE

The whole process of procurement to assembly will be done locally by local engineers and staff. These toilets also ensure optimal use of space for building sanitary toilets in flood affected areas and minimal environmental damage and contamination of surrounding areas

DETAILS OF TEAM LEADER AND TEAM MEMBERS

Name : **Dr Mridul Kumar Deka**
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INNOVATION -3

INNOVATION NAME: HIGH RAISED HAND PUMP- A BOON FOR THE FLOOD AFFECTED PEOPLE

Name of the Applicant/Organization/Institution/Firm/Start Up: Rural Volunteers Centre (RVC)

PROBLEM

Safe drinking water is not available to the community of flood prone area during flood. This innovation is an attempt to solve such a problem with innovation of new mechanism of hand pump. Flood situations in Dhemaji since last twenty years and from the past experience from grass root level it has been observed that though there are many problems faced by the flood affected people but the availability of safe drinking water remains one the most basic and important need of the community. Hand Pumps are the major sources of drinking water in the community but during flood these are submerged and people have no option left than drinking

The raised hand pump in Nepali Pathar under Muktiar GP

contaminated flood water. Flood water contains waste materials, dead and decay materials, faeces, excreta, etc. which carries harmful microorganism and leads to various serious water borne diseases like cholera, hepatitis, diarrhoea etc. The residents of flood-affected areas have to bear the brunt of these waterborne diseases.

CORE TECHNICAL INNOVATION

Low cost mechanism to have safe drinking water during normal and flood disaster period.

INNOVATION SUMMARY

Safe drinking water is easily accessible to the community during disaster period with the use of newly mechanized hand pump system. The high raised hand pumps can be the only support for drinking safe water during flood and also result in prevention of many waterborne diseases in the community and lessen their suffering in such a time of emergency. The height of the hand pump is 2-3 feet more than the highest flood level during past years. The hand pump area is designed in a way that it can be accessed by, children, women, specially abled and old people

CONSUMER/TARGET AUDIENCE

Flood affected community mainly in the rural areas

IMPORTANCE OF INNOVATION

- Quick adjustment with normal and flood disaster situation.
- Low material cost and easily accessible.
- Innovated modal is easy to understand and adopt.

This innovation is already in use. The raised hand pump in Nepali Pathar under Muktiar GP is the only source of safe drinking water in this flood situation. The Hand pump on raised concrete plinth (10 feet high) was set up by RVC through the support of Save the Children in 2016. 68 households encompassing 408 populations are availing this facility. For the last 3 days this is the only source of safe drinking water as the other hand pumps are been submerged.

PROPOSED INNOVATION MEETS MAKE IN INDIA INITIATIVE

Government of India can easily ensure safe drinking water for the targeted community through the application of appropriate technology and locally available recourses.

High raised hand Pump

DETAILS OF TEAM LEADER AND TEAM MEMBERS

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Nationality : Indian

INNOVATION - 4

INNOVATION NAME: MICROWAVE REMOTE SENSING FOR NEAR REAL-TIME INUNDATION MAPPING AND IDENTIFICATION OF EMBANKMENT BREACHES

Name of the Applicant/Organization/Institution/Firm/Start Up: Shri. Ranjit Das (Scientist – SE), Ms. Suranjana Bhaswati Borah (Research Scientist) from North Eastern Space Application Centre (NESAC)

PROBLEM

Assam, on the Brahmaputra floodplains, is one of the states of India where colossal destruction occurs every year during monsoon due to floods prompting loss of important lives and property. Around 40% of the state of Assam is inclined to yearly flooding which is further aggravated due to severe erosion and embankment breaching. Uninterrupted and real-time monitoring is required for formulating management strategies so that the annual losses due to embankment breaching can be limited.

CORE TECHNICAL INNOVATION

Use of dual polarized (VV/VH) SAR data for flood monitoring and damage assessment. Very less backscatter was observed from standing water as anticipated from previous research works due to the specular reflection of the incident signal. However, the return signal from high soil moisture areas is of same polarization as illuminated signal. It is clearly seen that soil moisture areas are prominent in VH polarized data with low backscatter similar to open water compared to VV polarization with low backscatter from open water and high from soil moisture areas. This study has developed the approach for inundation mapping and identification of embankment breaches using dual polarized SAR data. The process can be further automated using baseline information in combination with near real time SAR data.

INNOVATION SUMMARY

Flood monitoring is a very critical component of disaster management in Assam. Optical remote sensing in conjunction with ground based monitoring used for this purpose suffers from weather imposed and temporal restrictions such as heavy rains and cloud cover. Hence we have proposed a microwave remote sensing technique to overcome these problems and provide us with near real time data about the flood affected areas, for better decision making capability.

CONSUMER/TARGET AUDIENCE

Policy and decision makers (Government Organizations/ NGOs), floodplain dwellers.

IMPORTANCE OF INNOVATION

Conventional on-site strategies are tedious and time-consuming. Remote sensing offers the advantage of synoptic and temporal coverage consequently lessening the exertion and time required for appraisal of flood affected areas. Typical remote sensing techniques using optical data has several drawbacks which can be overcome to some extent using Synthetic

Aperture Radar (SAR) data due to its all-weather (clouds, fog, smoke and partly rain) capability and high sensitivity towards target characteristics such are dielectric, structural as well as geometrical properties.

The Innovation can provide synoptic and temporal coverage consequently lessening the exertion and time required for appraisal of flood affected areas.

PROPOSED INNOVATION MEETS MAKE IN INDIA INITIATIVE?

India is going to launch several microwave remote sensing satellites enabling us to use our own indigenous products for effective flood monitoring studies. The proposed methodology will be helpful to define the approaches for the use of these microwave remote sensing data.

DETAILS OF TEAM LEADER AND TEAM MEMBERS

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Institute : **North Eastern Space Applications Centre, Department of Space**
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INNOVATION -5

INNOVATION NAME: FLOOD RESILIENT SHELTER FOR CHAR DWELLERS

Name of the Applicant/Organization/Institution/Firm/Start Up: Jhai Foundation

PROBLEM

The innovation is a model for reducing the disaster risk by solving the shelter problem in char areas of Assam through cost effective plinth raising earth work. The flood water inundates the houses in char areas resulting in displacement, drowning of children, washing away livestock, damaging household assets and severely affecting the overall economy, education and health condition of the family. The flood resilient shelter has been successful in checking these entire problems significantly.

CORE TECHNICAL INNOVATION

There are four major technical components in the project i.e. i) beneficiary selection, ii) training and capacity building, iii) earth work and iv) hand-holding support

- Beneficiary Selection: It's a rigorous process, first a high power screening committee is formed in the targeted char area. The committee

consists of the members of Panchayat Raj Institution (PRI), school teachers, community leaders, ASHA workers, Anganwadi Workers and others. The committee is trained and acquainted with the aims and objective of plinth raising earth work. The committee outlines a selection criteria based on vulnerability (status of the plinth, destitute, women headed, and family having physically and mentally challenged families, elderly and children), participation in change process (Attendance in Structural Learning Program session, sends girl child to school, despite being poor tried to raise the plinth). Apart from economic status there are some negative criterions like practicing child marriage, child labour etc.

- Training & Capacity Building: Once the selection of the beneficiaries is done, they take part in a two days basic training workshop. The participants, mostly women learnt about various aspects of disaster as well as mitigation and coping mechanism. At the end of the training workshop, the participants pledge to start homestead gardening, sending their below 14 years old children to school and start de-compost and vermin-compost unit in their house.

- Plinth Raising Earth Work: The plinth of the house is raised members of screening committee identify the last known highest flood level using participatory research tools and fix the level of the plinth

- Handholding: The Handholding support is provided to start homestead garden, de-compost and vermin-compost unit to start organic vegetable cultivation.

INNOVATION SUMMARY

This model will be one of the most effective in terms of both reducing the disaster risk and as well as being costs to tackle the flood inundation in char areas.

CONSUMER/TARGET AUDIENCE

This model of 'flood resilient shelter' is targeted for the flood affected impoverished char dwellers of Assam. In Assam there are more than two thousand two hundred char or river island villages accommodating an estimated ten per cent of Assam's population. These chars are one of the most vulnerable and get severely affected during the annual flood in Brahmaputra valley. The char population is one of the most marginalized communities in Assam with nearly half of the people are living below poverty line (Assam Human Development Report 2014)

IMPORTANCE OF INNOVATION

The inundation of house during flood affects every aspect of the live in char areas. Surviving the flood inundation helps in reducing many disaster risks and accelerates human development. Under this project we raised the plinth of 50 poorest of poor families in three char villages in Barpeta district of Assam in May 2017. The entire project costs Rs. 4.5 lakhs or on an average Rs. 9000/- for one family. The beneficiary families survived the devastating flood webs of 2017. The families not only evaded the damaged caused by flood also contributed the health and well-being of the family member by producing organic vegetables on the homestead garden on the raised plinth of the house. There are many households who have the financial capacity to raise the plinth of their house by their own. Once the model is known to them and they will know about its effectiveness in tackling flood inundation it will be replicated by the community.

PROPOSED INNOVATION MEETS MAKE IN INDIA INITIATIVE

Char areas are famous for its fertile and agricultural produce. If this model can be replicated among large number of families, the organic vegetable produced from the homestead garden on the raised plinth can bring an organic revolution in Assam.

DETAILS OF TEAM LEADER AND TEAM MEMBERS Name:

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Nationality : **Indian**

INNOVATION -6

INNOVATION NAME: LOW COST LOCALLY DEVELOPED LIFE SAVING OBJECT.

Name of the Applicant/Organization/Institution/Firm/Start Up: Chawdang Pather Technical Training Center (CTTC)

PROBLEM

In Golaghat the floods are caused every year. In Chaudangpather area also, every year there is occurrence of flash flood due to rainwater flowing from the Naga hills. The floods have affected human lives with their properties and animals. In Assam the floods are caused every year. The floods have affected the human population and also the animal population at large .That is why, it is most serious matter to rescue the human beings and also the animals

CORE TECHNICAL INNOVATION

The objects made by our institution are listed below:

I. Bamboo Boat: It is made by bamboo (stick) and polythene or aluminum plain sheet.
II. Bamboo raft: It is made by bamboo stick and thermocol sheet.
III. A special raft made by cloth and thermocol.
IV. Boat safety bar: It helps more is the safety of hand boat.

V. Floating House: It stands on the ground normally, but during flood water it is floated depending on the level of water.
VI. Plate form Boat: These types of boats generally work as a normal boat. But in emergency, two or three boats easily make a plate form in rescuing mainly the animals.
VII. Life Jacket (Made of thermocol and cloth)
VIII. Safety Bag (cloth bag filled with empty bottles tightly closed)

Figure 1 CTTC preparing the Improvised boats

Summarize your Innovation.

The innovation include improvised lifesaving objects like boats and life jackets. The life jackets made of thermocol and cloth stitched together is a replica of the life jackets used by the rescue forces like SDRF. The thermocol can be bought from the market or collected from the fish markets at a low cost and a piece of cloth for making the life jacket. The boats mainly made of bamboo and aluminum sheet. Thermocol sheets are also used to increase its floating capacity. As per recommendation from the IWT department, tar can also be used to strengthen the boats. The boats are to be used in low current flood water. The innovation can be helpful to the flood affected people. The rural community can easily gather the required resources and develop the improvised objects.

CONSUMER/TARGET AUDIENCE

All the people affected by flood. It is also used by the rescuer.

IMPORTANCE OF INNOVATION

As the location from the district HQ is around 30 km, the response time taken by the emergency services like Fire and SDRF is around an hour. Therefore, as a first responder and volunteer organization it is the sole objective of the CTTC to help the flood affected community and conduct search and rescue operations with assistance from the District Administration to minimize the loss of life and property.
These improvised lifesaving objects were seen to be effective for use in flood water as tested. But, in rivers like Dhansiri and Brahmaputra during high flood it cannot be used due to heavy flow of river current.

There are many poor people included the flood affected area .They are unable to buy the defined lifesaving objects which are generally available in the market. So, the low cost lifesaving objects are mostly required. The low cost life saving objects help the flood affected people. Using these objects, they are able to save their lives and property along with animals.

PROPOSED INNOVATION MEETS MAKE IN INDIA INITIATIVE?

Our low-cost lives saving objects are made by locality by using the objects which generally found in the village areas. These objects, therefore, are available at low-cost that the affected people of Assam can make and also buy.

DETAILS OF TEAM LEADER AND TEAM MEMBERS

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INNOVATION -7

INNOVATION NAME: EMERGENCY RESCUE BOAT

Name of the Applicant/Organization/Institution/Firm/Start Up: Firm; Durrah Febsteel

Innovation Questions & Answers with the team

PROBLEM

During flood in Assam which occurs every, the focus is to rescue the flood affected people, supply relief materials to the flood affected people and also to save properties of flood affected people

CORE TECHNICAL INNOVATION

Fiber coated boat made of locally available raw materials built in low cost having longivity.

INNOVATION SUMMARY

It is experienced that a boat made of woods only lasts for a few years as it is damaged day by day in contact with water. If it is coated with fiber no water can damage the main body of the boat and it lasts for several decades. We can use bamboo made boats also with same technology in a very low cost which can be used for more than 25 years,

CONSUMER/TARGET AUDIENCE

Flood affected people irrespective of all age groups and gender especially for the people living in riverine (char) area and river banks.

IMPORTANCE OF INNOVATION the impact of your solution in terms of efficiency, output, cost saving, etc.

Many people die during the period of flood due to lack of boats to rescue them. Similarly livestocks (hens, ducks, cows, goats and buffaloes also die or wash away. the boat with fiber coating has long life for low-cost. The boat can be used in all the watersheds having current or logged area. It can be used for transportation of goods, rescue of affected people and livestock's, fishing and other emergency purposes

What is target audience using right now to solve the problem

Millions of flood affected people in Assam.

PROPOSED INNOVATION MEETS MAKE IN INDIA INITIATIVE

It will minimise the death rates and casualties caused by flood and erosion in the state. On the other hand it can help to protect the properties and livestocks of flood affected people and also be used for the purpose of cultivation, fishing and livelihood.

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INNOVATION -8

INNOVATION NAME: DESIGN AND FABRICATION OF A FLOOD RELIEF RAFT

Name of the Applicant/Organization/Institution/Firm/Start Up: Swarup Kumar Kalita

PROBLEM

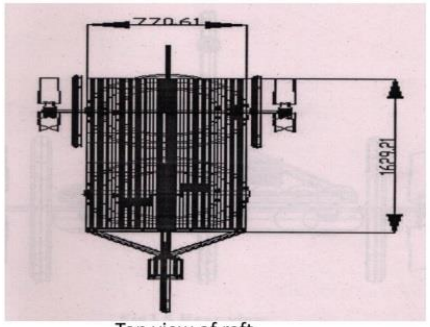
The flood relief raft is a handy solution for people living in flood affected urban and rural Areas. The flood relief raft has the versatile feature of moving both in land and water. This is a very important feature of the raft as in inundated areas, there are regions which are shallow and there are regions which are deep. It is a kind of all-weather raft. It is manually driven pedal system and can be improvised to driven by battery power.

CORE TECHNICAL INNOVATION

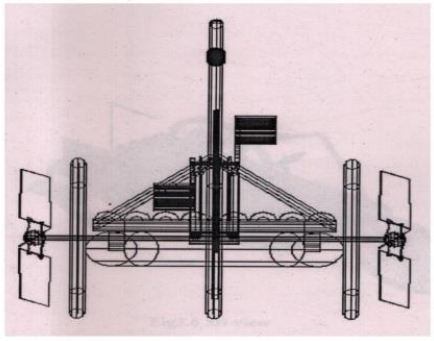
Developing amphibious raft with simple design is my core technical innovation. I had also developed smart material actuated endoscope, Energy harvesting device.

INNOVATION SUMMARY

It The flood relief raft uses a chain drive transmission system. It is operated by foot driven pedal system. The driven sprocket is mounted on the shaft. On pedaling, the driver sprocket rotates and consequently the power gets transmitted to the shaft through the driven sprocket. The ends of the shaft are provided with wheels. The extreme ends of the shaft are provided with fans. Two inflated tubes are placed below the chassis. The navigation of the raft on water is by a handle operated rudder. The same handle has wheel attached to its bottom position, which helps it to navigate on land. The operating principle of the flood relief raft is based on two important parameters, i.e. buoyancy for flotation of the raft and the propulsion for its movement. The principle of buoyancy states "When a body is submerged in a fluid, an upward force is exerted by the fluid on the body. This upward force is equal to the weight of the fluid displaced by the submerged part of the body and is called force of buoyancy". In this work, the force of buoyancy is solely provided by two tubes as shown in the figure below. The objective is to ensure that the flood relief raft is in stable equilibrium



Top view of raft


Front view of raft

CONSUMER/TARGET AUDIENCE

The flood relief raft has a simple design and is within the reach of common people. This is also for the government and disaster management forces for helping and efforts in aiding flood victims. In urban areas, artificial flood is a problem where transportation is partially paralyzed. During this period people can't use their vehicle for travelling and for pedestrian also it is difficult and risky for walking in rising muddy water level. So, it can also be used by local people in places where there is a problem in transportation during artificial flood.

IMPORTANCE OF INNOVATION

The flood in Assam is a serious problem and sending aid to flood victim, transferring people to safe shelter is also a challengeable job. There are places where water level are shallow and deep, due to this water height difference normal inflatable boat can't move to desired areas. So, my designed raft can overcome these difficulties and is environment friendly.

The raft is manually driven and so operating cost is less compared to other motor driven boat. The improved model of raft with motor driven powered by battery will reduce paddling effort. The flood victims of state are served by inflatable boat, but this will not work for shallow water level. The same problem will arise while helping victims of artificial flood in urban areas. The government of state and disaster management forces can use this idea to help needy people In flood. Apart from human transportation, large scale model can also be used to shift cattle and Valuable things to safer place.

PROPOSED INNOVATION MEETS MAKE IN INDIA INITIATIVE

The primary goal of Make in India initiative is making India a global manufacturing hub, by encouraging both Multinational as well as domestic companies to manufacture their Products within the country. My proposed innovation with some improvisation of model can meet various demand of people. So, by achieving various demands with good working Condition, it can create new business line for local youth.

DETAILS OF TEAM LEADER AND TEAM MEMBERS

Name : **SWARUP KUMAR KALITA**
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Nationality : **Indian**

INNOVATION -9

INNOVATION NAME: LOCAL SKILL ADOPTED BY COMMUNITY TO PREVENT DAMAGE OF TIN ROOFED KUTCHA HOUSE FROM STORM

Name of the Applicant/Organization/Institution/Firm/Start Up: Sri Deepmani Talukdar, Field Officer, Nalbari Revenue Circle, DDMA, Nalbari

PROBLEM

Storm is a recurring natural phenomenon of Nalbari district. Kutch houses with tin roofs are more vulnerable to storm as the tin sheets are erected over the bamboo poles while making roof of house. This tin sheet is blown out from the bamboo frame during the time of storm. This has caused damage to houses as well as other household properties. Moreover there are chances of casualty to human and domestic animals.

CORE TECHNICAL INNOVATION

This is the local skill adopted by low income group of families in order to protect their houses from storm.

INNOVATION SUMMARY

Tin roof over a bamboframe is commonly seen in rural areas as residential houses. Even in urban slum also such type of residential houses are seen. People also construct such type of house for the purpose of kitchen, grain

house and cattle shed. Asbestos sheet or galvanized iron sheets are erected over a bamboo frame to make roof of the house. Then few bamboo poles are placed over the tin sheet (dhaam) and the pole end is tied by rope or cane with another pole end of a bamboo placed below the tin sheet (maalli) over the bamboo frame. During the storm or high speed wind, teens are separated out from the frame and blown out from the house. This has caused damage to house as well as other household property .Even there is chances of casualty both for man and domestic animal. To keep the tin intact during the storm, people use a robust rope (plastic/jute made) having the minimum diatermer of 5 -10mm .The one end of the rope is tied over the dhaam (Dhaam, a local name – a bamboo pole placed over the tin sheet) with maalli (Maalli a local name- a bamboo pole placed below the tin sheets over the post) and the other end of the rope is tied with a bamboo nail (about 3-4 feet length) buried near the plinth of the house. The rope is tied in such a way so that it can give sufficient tensile strength to the bamboo dhaam and maalli. Each and every dhaam and maalli are tied by the rope in both the end.

CONSUMER/TARGET AUDIENCE

The problem is mostly encountered by low income group of families whose residential houses are made with tin sheets roofs over a bamboo frame. Mostly landless farmers, daily wage labour, slum workers, agricultural labour, cart puller, rickshaw puller and even some lower middle class families using such type of houses for kitchen /cattle sheds are more prone to such type of vulnerability. These types of residential houses are commonly seen in the rural as well as in urban periphery.

This is the local skill adopted by low income group of families in order to protect their houses from storm. People who are residing such type of houses are from low income group. They cannot afford to construct costly storm resistant house like Masonry Building or RCC building. Moreover storm generally comes in a particular time in a year. The skill has been used by few families in Govindapur village, Haripur village of Nalbari Revenue Circle of Nalbari district. The skill is very effective as it has been observed that families who are using this skill, their tin roofed kutcha houses remained intact at the time of storm without much damage. The cost is very less as the investment is only for purchase of few meters of plastic or jute rope having the minimum diameter of 5mm to 10mm .

IMPORTANCE OF INNOVATION

People who are residing such type of houses are from low income group. They cannot afford to construct costly storm resistant house like Masonry Building or RCC building. Moreover storm generally comes in a particular time in a year. The skill has been used by few families in Govndapur village, Haripur village of Nalbari Revenue Circle. The skill is very effective as it has been observed that families who are using this skill, their tin roofed kutcha houses remained intact at the time of storm without much damage. The cost is very less as the investment is only for purchase of few meters of plastic or jute rope having the minimum diameter of 5mm to 10mm . Mostly landless farmers, daily wage labour, slum workers, agricultural labour, cart puller, rickshaw puller of village Haripur and Govindapur under Nalbari Revenue Circle are using this local skill. The skill is easy, low cost and ordinary labour can also do the work. There is scope to develop this skill to adopt in low cost housing for rural as well as for urban areas. No imported item is required to use the said skill

PROPOSED INNOVATION MEETS MAKE IN INDIA INITIATIVE

All raw materials are locally available and hence are cheap. The innovation can therefore be widely used by the common people in the rural areas

Details of Inventor of the skill:

Name : Sri Ramesh Barman
Contact Numbers :
Email id :
Qualifications : Upper Primary
Nationality : Indian

INNOVATION -10

NAME OF THE INNOVATION: - DRONE IN DISASTER MANAGEMENT

Name of the Applicant/Organization/Institution/Firm/Start Up: Cesta Enterprise

PROBLEM

Event like Chemical, biological, radiological, nuclear or explosive make unsafe conditions not only for the people exposed to hazardous materials, but also relief workers. Large scale disaster i.e. earthquake and flooding benefits greatly from visual imaging. Manned Aircraft are often too expensive to use, satellite mapping does not meet high resolution needs both take much time during emergency situation. Water and food/medicines can be transferred by drone and can be eliminate the risks of placing human operated aircraft which is more expensive. Therefore the Innovation aims at

a. Reconnaissance, Mapping and Risk assessment
b. Structural Integrity assessment
c. Temporary Infrastructure and supply delivery (Logistic support)
d. High rise building fire response
e. Search and Rescue Operations

CORE TECHNICAL INNOVATION

We provide drone and UAV's as per our client requirement; we are interacted to replace human operated aircraft which are more expensive than drone. Our innovation will increase work efficiency and productivity decreasing workload and Risk and operated cost and resolving security Issue.

INNOVATION SUMMARY

We are a vertically integrated aerial robotics company creating cutting edge technology solutions for unmanned system applications built on a strong foundation of inter-disciplinary engineering; we deliver high

performance safe and autonomous unmanned system for enhancing safety and security for our client.

CONSUMER/TARGET AUDIENCE

We provide drone and UAV solution to our clients who are above 18 years age. Our client are the Government and private organisation i.e. Indian Army, CRPF, NDRF, Police, NTPC, Indian Oil, Oil India, CBI etc.

IMPORTANCE OF INNOVATION

The benefits of drones in an emergency are characterised by reach, speed, safety and cost. When there is no power, a UAV can fly through dark and live stream night vision footage to people on the ground. Drone can pinpoint the location of survivors so rescuers know where to go. They can go into dangerous situation that would otherwise be highly risky for responders on foot. Therefore the drone can do the following

I. It can save life
II. It can support law enforcement
III. It can reduce the cost of reconnaissance, Mapping and Risk assessment.
IV. It will decrease the response time for relief and inspection.

PROPOSED INNOVATION MEETS MAKE IN INDIA INITIATIVE

We are an Indian Organisation from our proposed innovation hundreds of people who are working with our organisation will be benefited and apart from them it will save life of thousands who are trapped in a disaster. Our innovation can be used in every aspect, so it will create a boom in the market and will often new jobs in India.

DETAILS OF TEAM LEADER AND TEAM MEMBERS

Name : **Ashim Dey**
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Nationality : **India**

INNOVATION -11

NAME OF THE INNOVATION: - AUTO-6-COPTER

Name of the Applicant/Organization/Institution/Firm/Start Up: Rajan Sukanth /4i Labs - IITG

PROBLEM

During many disasters, such as earthquakes, cyclones, fire accidents, nuclear accidents people are trapped in collapsed buildings and other inaccessible areas. Our project can be used to determine places where people are stuck and pin point their location and it can also generate 2D-map of the disaster prone area, which can be used for planning rescue missions.

CORE TECHNICAL INNOVATION

The drone is made autonomous, so that the drone can fly on its own without any human help.

INNOVATION SUMMARY

We have integrated PX4 architecture based PIXHawk with ROS to make drone autonomous, we are just required to give starting and end point after which it will move by itself and simultaneously creating a 2D Map of the area. It will also have capabilities to send video feeds to the control base. How will your Innovation benefit your target audience?

It will largely reduce the equipment requirement and time required to plan the rescue operations which in turn will reduce the cost of carrying out the operations.

CONSUMER/TARGET AUDIENCE

Our prime consumer target is government organisations such as Military, rescue teams and NGO who help the disaster affected areas.

IMPORTANCE OF INNOVATION

Using drones for rescue operation matters a lot as it can go to places where it is impossible for rescuers to go which will eventually decrease the number of casualties. The time taken to rescue also decreases drastically. Our solution is a very efficient one due to its form factor, it will save lives and money as rescue operations also put lives of rescuers at danger.

PROPOSED INNOVATION MEETS MAKE IN INDIA INITIATIVE

Our proposal contains many sensors which are not available in India and these sensors are very expensive and have to be imported. If we do large scale production then these parts will be made in India.

DETAILS OF TEAM LEADER AND TEAM MEMBERS

Name : **Rajan Sukanth (Team Leader)**
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MENTOR:
Name : **Manu Tej Sharma**
Contact Numbers : **84896723184**
Qualifications : **B.tech 4th year biotech, IIT Guwahati**
Nationality : **India**

INNOVATION -12

NAME OF THE INNOVATION: - LITTLE HEART

Name of the Applicant/Organization/Institution/Firm/Start Up: Eco Enterprise

PROBLEM

The need of the people residing in high flood zone especially in the urban areas shows the importance of a flood warning system for monitoring of water level and alert mechanism for evacuation if needed. Most of the times it happens that people are marooned in the flood waters for not having any warning system during a flood.

According to our recent survey done in the premise of Guwahati in various location only 1% of people have taken any action oriented approach in disaster preparedness. They don't have an emergency exit plans in their homes. No community level concrete body to monitor the actual preparedness level.

Every individual is prepared to confront any disaster being 'A Wind of Change' to create awareness among the mass for a secured future against catastrophes. a school can be a locus for change , not only in increasing institutional capacity in building resilience itself, but also in mobilizing the community in delivering an authentic disaster risk reduction message an operational level, with an ability to bring together people in an around the local, regional and national level.

CORE TECHNICAL INNOVATION

It is a **survival bag which** is a package of basic tools and supplies prepared in advance as an aid to survival in an emergency. There is also a solar powered wireless water level indicator. Thirdly, there a working concept of geo tagging app which will help to reduce the reaction time in any emergency.

INNOVATION SUMMARY

Little heart app:- this app works in the concept of geo-tagging where the metadata is send along with the actual picture on the ground which is then automated to concern departments for faster reaction time which may save life in golden hours.

Little heart early warning system:- some disaster are slow onset and some are sudden onset disasters. Depending on type of disaster we are working on little heart earthquake alarm and little heart flood warning system. The earthquake alarm works on the principle of capturing p-wave which moves faster occurs before an s-wave. This will results in giving us a warning before the actual shake.

Little heart flood warning system: - Real time water level indicator of the rivers can give us vital information which can be used to predict the probable flood. This type of water level sensors network is distributed to flood zones where real time data is analysed for probable maximum flood and model it if needed.

CONSUMER/TARGET AUDIENCE

The main target group will be the children studying at various schools and by means of them beneficiaries should include their parents and respective people who are associates with the children.

IMPORTANCE OF INNOVATION.

Flood warning is an effective and low cost solution for the said problems, which overcomes traditional solution by the use of technological advancements in the simplified manner.

As a part of preparedness, a community can be made aware of the high water level and alarm beforehand. Flood warnings are a highly important adaptive measure where protection through large scale, hard defences, is not desirable or possible.

DETAILS OF TEAM LEADER AND TEAM MEMBERS

Name : **Gauri Prasad Gogoi**
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Qualifications : **JE (civil), BE (Civil), Pursuing ME in water resource engineering.**
Nationality : **Indian**

INNOVATION -13

NAME OF THE INNOVATION: - Room Flood Protection System

Name of the Applicant/Organization/Institution/Firm/Start Up: Pratim Kumar Talukdar

PROBLEM

Floods are inherently less predictable. It can happen at any moment in the day and across almost all the seasons. People are often caught off guard and left to their own for protecting themselves. Further, the flood prone areas are cut off in critical moment and it takes hours for reliefs to arrive. So, our system is solving the problem of providing instant and in-situ protection to human beings and properties in time of flood. This is achieved without any manual effort or external power supply, nor any button press

CORE TECHNICAL INNOVATION

It is room flood protection system, which can be built from ground up or retrofitted in an existing room. It has a temporary floor, resting over the room floor but not affixed, which can be lifted up using the flood water. The flood water is accumulated in a container hanging inside a well, which in turn is located below the room. The cylindrical container is connected to the temporary floor by rope and pulley arrangement. The arrangement is made in a way to achieve upward motion of the temporary floor against the downward motion of the container. Further, the rope- pulley arrangement is made in such a way that we achieve mechanical advantage for lifting greater weight over the temporary floor.

In flood scenario, flood water moves towards the well and is accumulated inside the container. Consequently, the weight of the accumulated water leads to downward movement of the container and upward movement of the temporary flood inside the room. Any lives and goods located on the temporary floor are hereby lifted above the flood water level and gets sufficient protection.

The core benefit is the protection of lives and belongings right in the room and at the very moment flood water starts to arrive. So, even a person sleeping over the temporary floor will be protected, without a single intervention.

There are secondary utilities of the system like rain water harvesting in dry seasons, which is achieved by using the same well with minimal piping and a hand pump.

Key Limitations:

- Weight of lives and goods over the temporary floor is constrained by the design of the system.
- The height to which temporary floor can be lifted is constrained by the design of the system..

INNOVATION SUMMARY

The innovation is in the domain of flood protection system. The core system provides instant, in-situ flood protection to inhabitants inside a specially designed room. This is a passive system, actuated and operated with the weight of flood water.

The system, besides providing core benefits, provides ancillary benefits in form of rain water harvesting in dry seasons. The innovation has immediate utility in terms of saving lives and properties, which leads to long term economic benefits.

CONSUMER/TARGET AUDIENCE

All inhabitants of flood prone areas across geographies, age-groups, income levels and occupation are potential beneficiaries of the innovation.

IMPORTANCE OF INNOVATION.

Flood is a perennial problem and continuously becoming common around the globe. It has immense social and economic impact. So, any solution, even for a part of the problem, mitigates the impacts on both fronts in greater geographic coverage. Our solution, in particular, has natural advantage of efficiency as it requires no fuel or manual effort for operation. It is a passive system, actuated and operated with the weight of flood water. The system is built over mechanical advantage principle which further enhances the live weight capacity for protection. So, the efficiency is highest possible, though it does not count in as a major factor for this product. There is no direct output from the system. The value of lives and properties saved over a period adds up to the total value from the system. On the economic front, the live size implementation of the product will have upfront cost, but it is outweighed by net benefits in longer run. Absence of any complex technologies and limited moving parts make the product less prone to maintenance thereby reducing the maintenance costs.

DETAILS OF TEAM LEADER AND TEAM MEMBERS

Name : Pratim Kumar Talukda (Team Leader) Ranjan Malakar

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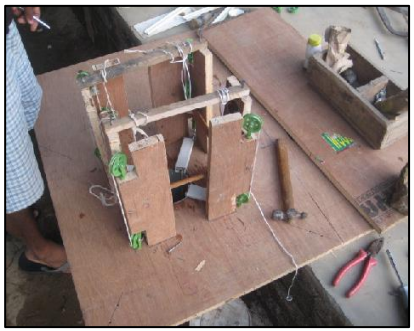
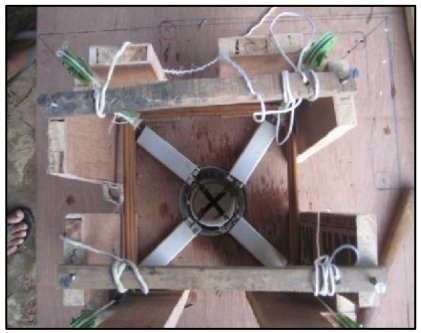
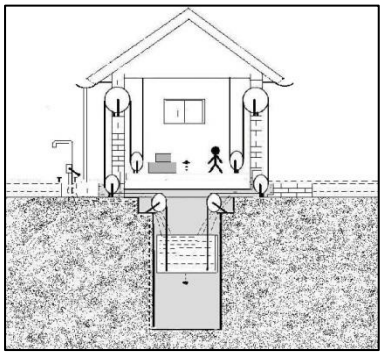
Qualifications : B.Tech (Mechanical Engineering)
Nationality : Indian







ASSAM STATE DISASTER MANAGEMENT AUTHORITY OBSERVES INTERNATIONAL DAY FOR DISASTER REDUCTION 2017

The International Day for Disaster Reduction (IDDR) is a day to celebrate how people and communities are reducing their risk to disasters and raising awareness about the importance of DRR. It's also a day to encourage every citizen and government to take part in building more disaster resilient communities and nations. The 2017 edition continues as part of the "Sendai Seven" campaign, centred on the seven targets of the Sendai Framework. This year the focus is on Target B, of which the aim is to reduce the number of people affected by disasters by 2030. The theme of IDDR for the year 2017 is “Home Safe Home: REDUCING EXPOSURE, REDUCING DISPLACEMENT”

WORKSHOP

The Assam State Disaster Management Authority, observed the International Day for Disaster Reduction (IDDR, 2017), in collaboration with UNICEF, Assam to achieve the global target of *Reducing exposure of communities to different Hazards and thereby reducing displacement during disasters o*n 13th October 2017 at the Assam Administrative Staff College, Khanapara Guwahati. A workshop on Safer Homes & Livelihood and an exhibition on Innovation Challenge on Disaster Risk Reduction was organised as a part of the event.

Chief Secretary, Government of Assam was the Chief Guest on the Occasion and in his inaugural speech said that he is glad to find that Disaster management initiatives of Assam is aligned to the 10-point agenda for disaster risk reduction as outlined by Shri. Narendra Modi, Hon'ble Prime Minister of India, in the Asian Ministerial Conference on DRR. He stressed on the fact that there should be greater consistency and coordination in our response to disasters. He particularly appreciated the innovations which were displayed at the Exhibition. He said that Assam should give focus on technology in order to enhance the efficiency of our disaster risk management efforts.

Shri A.P Rout, DGP & Director, Fire & Emergency Services was also present to grace the occasion. Shri Rajesh Prasad, IAS, Commissioner Secretary, Revenue & Disaster Management and Chief Executive Officer, Assam State Disaster Management Authority gave the welcome address. He said that the effort of the ASDMA is to bring together different stakeholders such as policy-makers, administrators, departmental functionaries, WDMCs, NGOs, community leaders and private stakeholders for a comprehensive consultation on disaster risk reduction and preparedness and to identify opportunities for disaster risk management. Shri Rajib Prakash Baruah, ACS, State Project Coordinator, ASDMA gave the vote of thanks at the Inaugural session. Over 250 Participants attended the day long workshop. Disaster ready kits were also distributed to all at the end of the workshop

In the technical session, Shri Kamesh Salam, Founder, South Asia Bamboo Foundation, Member, World Bamboo Organization, spoke on the Usage of Bamboo Technology for Disaster Resilient Housing. Disaster Risk Reduction aspects on Safer Built Environment was given by Prof. Chandan Mahanta, Professor, Department of Civil Engineering, IIT, Guwahati. Prof. Jayanta Pathak, Deptt. of Civil Engineering, Assam Engineering College gave an overview on Safe Construction Practices. Disaster Risk Reduction issues in Livelihoods and Mitigation was highlighted by Shri. Dilip Kumar Bhanja , Technical Advisor to the Govt. of Ethiopia, UNDP. An overview of Earthquake Damage estimation for Guwahati City and Road ahead was given by Prof. Dominik Lang, from NORSAR, Norway. It was followed by an interactive session.

EXHIBITION

The exhibition titled "Innovation Challenge for Disaster Risk Reduction" which was conducted on the occasion witnessed some unique innovation from various institutions and individuals from within and outside the state giving solutions for various hazards like Storm, Fire, Earthquake and Flood. Over 200 students from various schools also visited the exhibition.

Assam State Disaster Management Authority, through this exhibition, tried to collate innovative ideas for disaster risk

reduction from different parts of the State and from different stakeholder communities. These ideas were well accepted by different sections of people starting from children to the adults. The ideas ranged from community prepared floating houses, bamboo boats, locally developed life jackets, early warning systems, disaster ready kits, flood resilient toilets, raised hand pumps with platforms to highly sophisticated drones for flood monitoring. However few of these local practices can be adopted by people in different parts of Assam for achieving resilience. Such solution centric approaches can also form a part of the community linked DRR policies and practices, which in turn can be integrated into state level and national level policies.

The prizes were given as follows

1st Prize: Rameez Ahmad Dar, B.Tech (CSE), Tezpur University, Assam and Suhail Ahmad Dar Jamia Milia Islamia University in New Delhi. There innovation was the fire-resistant cloth bag, which can be useful in evacuating people trapped in an inferno in a building

2nd Prize: Dr Mridul Kumar Deka, MBBS, MPH, Doctors For You who developed a model of a floating toilet. The model can ensure proper sanitation for flood victims.

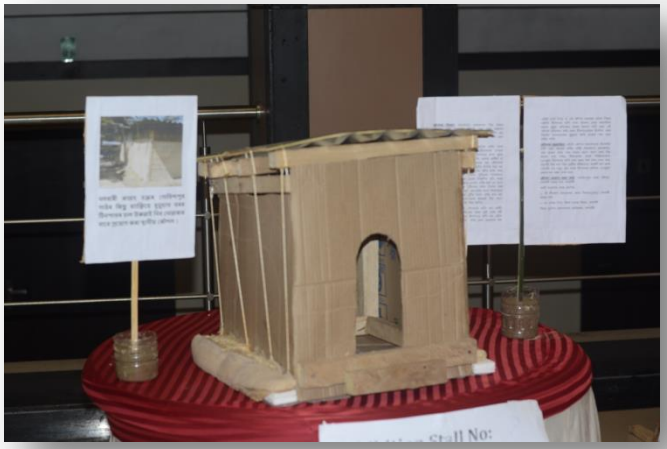
3rd Prize: Mr. Dharma Raj Karki,Rural Volunteers Centre (RVC) designed tubewells on raised platforms

MOCK DRILL IN DISTRICTS

It must also be mentioned here that in order to observe the International Day for Disaster Reduction (IDDR), Mock Drills on Earthquake and Fire Safety was organised simultaneous in 10 districts of Assam viz. Cachar, Dhemaji, Sibsagar, Jorhat, Majuli, Sonitpur, Darrang, Morigaon, Tinsukia and Kokrajhar. SDRF, NDRF, Fire and Emergency Services, Civil Defence, Home guards, Police took active participation in these exercises. A total of 1500 people were involved at the district level mock drills and the district level exercises were supported by the National Disaster Management Authority.

SNAPSHOT OF THE INNOVATIONS & THE EVENT

Assam State Disaster Management Authority | Dispur




DISASTER
RESILIENT TOILET
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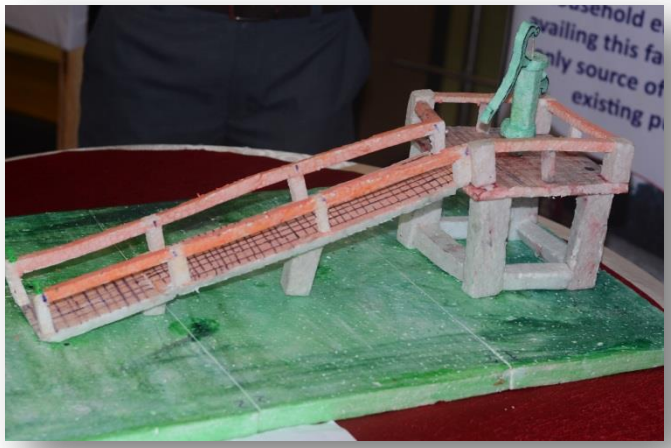


SNAPSHOT OF FLOOD 2017


Dominik H.
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norsar


unicef
for every
13th October
ASSAM ADMINIST
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unicef
for every child
WORKSHOP ON:
SAFER HOMES & LIVELIHOOD
On the occasion of
"International day for Disaster Reduction (IDDR) 20
13th October, 20
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