

**Early Warning Systems**  
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Tamil Nadu Science Forum.

**Episode: 50**

**Institutional mechanism for early warning system related to various disasters including international collaborations**  
**New Methods, science thereof, Indian preparedness for early warnings**

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Scene...1

**50 years ago..... In a village**

**Village dum dum announcer: dum..dum.. (Sound)**

dear village people...**dum....dum.... (Sound)** huge flood water is reaching our tank...  
**dum ..dum.. (Sound)**...it may lead to breach of our tank... **dum..dum.. (Sound)**.. Don't  
go to the river and cross.... **dum..dum.. (Sound)**.. don't allow children.... **dum..dum..**  
**(Sound)**.. Don't take cattle for grazing.. **dum..dum.. (Sound)**.. Don't go for fire wood  
collection **dum..dum.. (Sound)**.. The released gushing water of our tank will take you  
along with.. **dum..dum.. (Sound)**..

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Scene...2 TV Hall  
Dec 2016..

**TV news Reader:**

Now the weather report....the cyclone Vartha will cross the coast around  
4AM to day between Chennai and Cuddalore with a wind velocity of  
190KM. It may bring heavy rains in the coastal area. The rain fall  
expected to be around 21 cm.. Cyclone warning flag no 5 has been raised  
in Chennai. Fishermen are not advised to go to sea. The sea would be very  
rough.. The tides may rise upto two meters.. the coastal people and fisher  
men community will be evacuated very soon...

Now the revenue district secretatary speaks to the people...

**Revenue Secretary..**

Dear people. According to the weather report a strong cyclone is expected  
to hit our coastal area. Strong wind will flow. Heavy rain will come.. So

we have taken so many precautionary measures... we will take all coastal people to the cyclone protective shelters.. We will provide all relieves.. We have enough stock of food, fuel, etc., no need to be panic...the schools have been declared holiday for three days.

**Ravi:** hi...no school today and for another three days.. Jolly.. we can enjoy with TV shows..

**Mother:** Don't jump.. it may be happy to you....but the poor people have to leave their homes. They are going to suffer a lot....

**Saritha:** yes.. Mum... he is not at all worry about the poor people..

**Father:** Saritha.. he is also going to be affected... if the wind is high the electrical posts will fall down. Trees will fall down.. Whole electricity will go... and then where to see TV programme...

**Ravi:** Is it so father..?

**Father:** Yes...

**Mother:** Not only that ....milk supply will not be there.. Drinking water may be contaminate.. So we have to be alert and prepare ourselves to face the wrath of cyclone... Though we live in pucca second floor flat..

**Father:** But we are warned of this cyclone.... the holidays for school itself is an early warning by which students are prevented from coming out of their homes..

... this early warning help us to face the dangerous situation..Earlier this system was not there..

**Saritha:** Then how did they manage...?

**Mother:** In ancient times they related flood to the position of stars.... In ancient civilizations, Egypt people believed that the appearance of Sirius Star would bring flood in Nile...

**Father:** You are correct... People in different civilizations looked after the sky for the warnings.. Even appearance of Comets, Eclipses, Full Moon , New moon were used as warning systems... later these periodical happenings were recorded in Panchangkam which was the referral books for rain,

droughts, floods etc., Still today the astrologers based upon this predict and warn the people..

**Mother:** But many a time astrological predictions were unsure and not dependable... But now we have very well developed scientific predictions that is giving warnings related to climate disasters using satellites and computer modulations..

**Saritha:** yes ma... The prediction by our Meteorological Dept. helped to save lives and properties in recent Odisha Cyclone and Vartha cyclone of Tamil Nadu..

**Ravi:** But Vartha cyclone has uprooted nearly a lakh trees... damaged glasses of high buildings.... Thatched houses..

**Mother:** That's true... but no life is lost. This was due to precision warning by the Meteorological Dept. As per their warning the wind speed and rain was reported...

**Ravi:** Yes ma.....but about what about warning system for other natural calamities by which we can warn the people.....

**Father:** That is a very good question. It is fortunate that an expert is interacting with the people through our AIR tomorrow. It is a programme and is answering the letters received from the listeners and also phone in programme. You both can talk to the expert over phone..

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### **Scene-3-AIR Station**

#### **Characters: Disaster Management Expert and the Announcer...**

**Announcer:**

Welcome to Radio listeners.....Every week in this hour we invite an expert in science and technology and have interactions with the Radio listeners. Today we are having an expert in the field of Disaster Management Dr. Valli.....We are very happy to have a women scientist in the programme after a long time. The radio listeners have already sent many letters with questions.....and we are also expecting

phone calls with questions from the listeners.....Let us have a wonderful programme today. Good evening madam...we welcome u to our studio...

**Dr.Valli:** Good evening... I am really happy to be here in All India Radio.. AIR is doing a wonderful science communication programme. I have also participated in Vigyan Prasar Radio programme earlier in our state....The radio serial by Vigyan Prasar is very interesting and they are sustaining the science communication programme and the tempo in all serials..

**Announcer:** Yes Madam...Our station is grateful to Vigyan Prasar and Prasar Bharathi for continuing the science radio serial and we are able to mobilize a lot of script writers and experts for various serials.. Thus we connect the scientists with the people silently...but with sound waves...

**Dr.Valli:** ha...haa... you are having a great sense of humor..

**Announcer:** Madam....We are having a lot of questions on disasters, disaster management and also early warning systems related to this..

**Dr.Valli:** That is great.. it may be due to day to day experiences and the devastations caused by disasters in various places all over the world. People want to know the science and the technology required for safe living..

**Announcer:** s...s .madam. You are correct. Shall a read some letters first till the on line caller come..

**Dr.Valli:** Ok...let us start..

**Announcer:** First listener from Rameswaram...his name is Subramanian.. He asked a question.... What are the different types of disasters..?

**Dr.Valli:** there are two types of Diasters..One is Natural disasters and the other is Man made disasters. Natural disasters may come within our earth or from the sky like asteroid or meteorite hit or solar winds...etc.. Which are very rare and can be predictable by our modern science and technology... the natural disasters within the earth like earth quake, Tsunami, floods, drought, forest fire, avalanches, land slides, volcanic eruptions, pest attack, communicable diseases.. we can list like this..

**Announcer:** great... plz list out man made disasters..

**Dr.Valli:** It includes road, air, ship accidents, fire accidents, stampede, industrial and nuclear disasters, oil spill, mines disasters.....etc... We have already covered these in the previous Radio Serial on Managing the Disasters...

**Announcer:** Second Radio listener....Shanamuga Sundaram from Madurai .... he asks....How to escape from disasters from the space...

**Dr.Valli:** We are watching the space by various satellites and astronomical telescopes and mapping their movement. So we can find out the time...distance etc., and inform the public. Our earth is almost safe now. It is a very rare event....and the debris reach is very minute which have not so far killed any human being.....

**Announcer:** But it happened during Dinosaur period and were wiped out..

**Dr.Valli:** It is true... If such thing happens we also would be wiped out. Such a mega hit may definitely dangerous....But it will be a rare event..

**Announcer:** yet another letter from a listener Mr. Varatharajan from Sivagangai.. How do we predict Earthquake (EQ)..?

**Dr.Valli:** Now we are able to predict Earthquake in advance. We are having two EQ warning centers in Uttarkhand which will detect a magnitude of 5 and will warn us before 1-40 seconds. Haryana state also has one centre. And also we have identified earthquake prone regions. So we have given warnings how to face the earthquake disaster and aftershocks.

**Announcer:** Madam. It is being told that animals can predict earthquake in advance and move from that area.

**Dr.Valli:** Sometimes may be true....that cannot be taken as a face value. We have identified EQ zones in India and all over India....sometimes we have mapped the expected strength of EQ in different zones...

**Announcer:** Madam.... Happy to have a first telephone call from one listener....

**Dr.Valli:** Fine....connect to him..

**Announcer:** Good Evening...my dear listener.. What is yr question..

**Caller 1:** Good evening...I am Saritha from Chennai speaking..

**Dr.Valli:** Good evening ... welcome. What is yr question....

**Caller 1:** Madam....is there any organizations for warning system for disasters..?

**Madam:** We are having WMO – World Meteorological Organization which regularly collaborate with various agencies particularly the International Strategy for Disaster Reduction to improve natural disaster prevention and mitigation. The world Conference on Disaster Reduction held at Hyogo, Japan in 2005 gave stress on the identification, assessment and to monitor risks and enhance early warnings. Another WMO commission for basic Systems providing assistance to prepare guidelines to reduce impact of any disaster through National Meteorological and Hydrological Services for each Nation.

**Caller 1:** Madam..How will the early warning systems help the community..?

**Dr.Valli:** Good question.... Let me tell. The early warning systems help to reduce risk of death, injury, property loss and damage....The warnings is made effective by extending the lead time of warnings...improving the accuracy of warnings....greater demand for probabilistic forecasts, better communication and dissemination of warnings, using new technologies to alert the public, targeting of the warning services to relevant and specific users at right time at the place and warning messages are understood and appropriate action taken in response.

**Caller 1:** Thank you madam.....

**Announcer:** Madam... Though we have a system of coordinated effort for early warnings how will be made useful to the community....

**Dr.Valli:** This is called people centered warning systems...the people centered must integrate four key elements..

**Announcer:** What are they...?

**Dr. Valli: First**

.... The knowledge of the risks already faced in a given area...**Second** ..Technical monitoring and warning service. ..**Third...** Dissemination of meaningful warnings to those at risk.... **Fourth** public awareness and preparedness to act.. These are the guidelines given at the 3<sup>rd</sup> International Conference on early Warning held at Bonn, Germany in 2006.

**Announcer:** Good Madam...But how will these be exactly translated at the field of disaster expected areas..?

**Dr.Valli:** This an appropriate question....this actually called people centered early warning system....the early warnings need to be.. Number **One** clearly understood by people, **second** ... easily and readily accessible to people....**third**....it should be timely; **fourth**... it should be tied to response to actions to be taken by the people in advance of and after the event.....

**Announcer:** Madam can you give one example for each....

**Dr.Valli:** Sure.... For the first...The warnings should be in local language...it may be oral announcement through AIR, loud Speakers, etc., or through visual media like TV, social network... or through public screening...poster display...or through print media like newspapers ....

**Announcer:** Example for the second

**Dr.Valli:** The warnings must reach the people easily and easily accessed by them in that area... for this each hamlet must be reached by Public Address system with speakers....and various other relevant methods.. like public awareness through gatherings..

**Announcer:** What about the third one...

**Dr.Valli...** that is... the warning must be timely... it should be given in advance... if it is not given in time there is no use at all...for example the 2004 Tsunami along our east coast ..We have lost almost 2, 20,000 lives....if we had an early warning system we would have saved all lives. This is being done in Pacific Ocean areas which are based at Hawaii....But at that time India was unknown of Tsunami and no warning system in our Indian Ocean. Now we have well developed Tsunami Warning System with international connectivity.... Another example is the early warning of Odisha Philine cyclone few years back completely saved the human lives. Only 21 people lost their deaths... Because of early warning system and is people centered.....

**Announcer;** Well said madam...regarding the fourth one....

**Dr.Valli:** that is... tied to response to actions to be taken by the people in advance of and after the event.....yes....warning alone won't help the people....this is very important... with out appropriates guidance to cope up with the situation it is not

useful moreover Govt. particularly local self Govt. should take actions with the community participation..

**Announcer:** Can you give one example for this....

**Dr.Valli:** With pleasure.... For example.... During the latest Vardha Cyclone in Tamil Nadu coastal area.... The Revenue Secretary announced through print and visual media that people have to move to Cyclone Protection Shelter and listed out the arrangements were made to take them and look after them....Thus the life of coastal people were saved...during this cyclone which crossed the coast with a wind speed of almost over 160 KM/hour ... after that havoc, people were advised to take safe boiled drinking water, health check up, given health awareness, hygienic food, etc., But the cyclone damaged their coastal habitations, boats, fishing net, power supply, livelihood.... this usually happens very slow in many of the countries.... These are the areas we have to strengthen immediately after the event...

**Announcer:** another caller is coming...

**Dr.Valli:** Plz give connection....

**Announcer:** A call from same number.....Hello welcome.....

**Caller-2:** Thank you.... I am Ravi....brother of Saritha...So calling from the same land line...

**Dr.Valli:** Welcome to this programme...Plz go ahead....

**Caller2:** Can u explain in detail about the four early warnings....

**Dr.Valli:** Sure.... First up all there should be knowledge about risk which includes hazards and vulnerabilities. It requires systematic data collection and analysis. These data must consider the socio economic conditions. Risk data should be based on applied research regarding hazards, development of historical data base of past severe disaster, production of hazard risk assessments and development of a national risk management plan for regional and local applications.....

**Caller 2:** Can you cite an example...

**Dr.Valli:** Why not..? Take Chennai flood in 2015 dec.as an example.... The data regarding flood and its disasters...The rain fall was around 60cm in two spells in a given month. Because of this heavy rain the storage tank was full suddenly..... So they opened that flood gates and as a result, the flooding took place and made a heavy human and property loss....this may be due to lack of risk hazard data and vulnerabilities. But this 2016 Dec. rain fall expected was 21cm and the rainfall was close to 21cm...i.e.19cm... Because of last year data and vulnerabilities this time Govt. is able to take precautionary measures and give earlier warnings...

**Caller 2 (Ravi):**

Thank you very much....well explained....

**Announcer:** What about the second one.... Monitoring and Warning service....

**Dr. Valli:** Monitoring service is observing and recording on going events of the expected natural calamities. These data is monitored and processed on a real time or near real time basis.... These data will be used for Numerical Weather Prediction Models.

For example the low pressure depression in the sea will be monitored and processed into models through internet which gives global models by which the Weather station can present the pictorial movement of low pressure area and warning about the rainfall and wind speed may be announced on real time basis....

**Announcer:** Fantastic....now a letter from a listener.... Mr.Jeevagan from Cumbam. He asks how the data and weather model may be communicated effectively.

**Dr. Valli:** This is what is called Dissemination and Communication....this will help the community warned in advance on the expected hazards. This must be made known to people and risk management authorities....Sometimes this warning may need international cooperation and hence it should be shared...This is very important for Tsunami warning...

**Announcer:** Can u explain it taking 2004 Tsunami...

**Dr.Valli:** Thank you....you himself have given an appropriate example. The 2004 Tsunami actually happened in the Indian Ocean in early morning near

Sumatra...they measured the earthquake around 9 Richter scale and it took place at a depth of around 30 meters... so the tides were expected high upto 10 meters and are moving towards coastal area of **India, Sri Lanka and upto Africa.....** But all these observational data and models could not be communicated at that time...hence the damage was unprecedented. The 2004 Tsunami reminds us the importance of Dissemination and communication....

**Announcer:** well explained madam.. Finally about public awareness and preparedness..

**Dr.Valli:** Yes.....this is essential for risk reduction and responding to the disasters by the community. This can be done by Public education and awareness, stakeholder involvement, warning presentation and warning communication....

**Announcer:** now a caller comes in the line.. Hello....

**Caller-3:** Hello.... Good evening madam... you have lucidly explained everything about warnings.... But people are not responding seriously. Why...

**Dr.Valli:** yes... Your statement is good .....warning message itself does not stimulate an immediate response from individuals. Individuals receiving the warning first assess their own personal sense of risk and seek a secondary source of confirmation. So we have to present reliable warnings through recognized organizations or leaders, we have to differentiate forecasts and warning... should be delivered by multiple credible sources, they should be consistent overtime.... warnings should be scientifically based.

**Announcer:** How to strengthen the people's response..

**Dr.Valli:** yes...this can be worked out. The community will be involved in discussion and collaborations for risk managements should be made... in certain cases we have to make regular tests and drills....etc. that will boost their confidence....

**Announcer:** Here is one letter asking on preparedness of the community....this question is asked by Prembabu from Paramakudi....

**Dr.Valli:** Well...this is enhanced through public education. The People should be familiarized with the danger of the hazards, the dissemination channels, and meaning of the warnings and actions to reduce losses and damages. Awareness of natural hazards should be covered in school curricula at all levels. Mass media and internet should be used to spread information. Special publicity and education campaigns may be needed to cater for special community groups like fishermen community as necessary. There are primers and books by which communities are educated.

**Announcer:** the other side also needs improvement..

**Dr.Valli:** s...s....This is called capacity building of warning specialists in Disaster Management Groups.... The following are to be enhanced....ongoing maintenance and improvement of infrastructure, development and improvement of technical, operational and dissemination capabilities, pure and applied science researches.... Periodic training to staff, partners and stake holders and finally on public education and awareness.

**Announcer:** we will wind up the programme with a final question form a listener..  
Mr.Baskar from Vadukapatti of Madurai District...

**Dr.Valli:** What is the question....?

**Announcer:** He is asking about the existing warning system in India?

**Dr.Valli:** We have established National Tsunami Early Warning system. It is coming under Ministry of earth sciences and coordinated by National Centre for Ocean Information services at Hyderabad. It has established 17 Seismic VSAT stations, 2 centre Seismic stations to provide seismic alert by SMS and email within 2minutes to the experts. The whole system comprises of 25 seismographic stations, 26 national tsunami information centres, six deep ocean Assessment and report of Tsunami Buoys. The data is being processed by the US Pacific Tsunami warning system. The warning will be issued by SMS, Radio and TV, sirens, loud speakers, police vehicles fitted with speakers. Our centre is monitoring the Indian ocean Tsunami and helpful to 28 countries.

**Announcer:** oh ..great..

**Dr.Valli:** In addition we have EQ warning units at Uttarkhand and Haryana as already mentioned. We have Indian Meteorological Department which completely monitors the weather situations and day by day report will be issued. Because of the strengthening of this department we able to evacuate people from the habitations very well in advance and reduced casualties particularly during 2013 Philine and 2014 Hud Hud cyclone which hit Odisha and Andhra. For example in 1999 super cyclone ten thousand people. But in 201 Philine cyclones it was around 21 in Odisha and 2014 Hud Hud it was 46 in two states. Satellite phones were distributed to representatives of 14 vulnerable districts of Odisha..

**Announcer:** wah.....

**Dr.Valli:** s... IMD is now able to cover 300 million vulnerable people in 1.5 lakh villages. It also helps to give early warnings to heavy precipitation in Himalayan region particularly in J and K state. Our Home Ministry in association with UNDP is implementing programmes related to the risk reduction and address the climate change....

**Announcer:** Thank you. Madam... You have given very elaborative scientific awareness to our listeners on Early Warning Systems on Disaster Management... Thank you...

**Dr.Valli:** You have given me a great opportunity to interact with the listeners. Thank you....bye...

**(The state level Script writers has to include State based Warning system in addition)**