STRENGTHENING RESILIENCE AND COPING CAPACITIES IN THE CARIBBEAN THROUGH INTEGRATED EARLY WARNING SYSTEMS PROJECT

ANGUILLA CASE STUDY

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Contents

SECTION A: DETAILS

Country:	Anguilla
Population:	15,000
Primary hazards faced (i.e. flooding, earthquakes, drought etc.):	Hurricane, Flash Flood, Earthquake, Fire, Tsunami

1) Introduction

The Caribbean is a region affected by many hazards with many islands having volcanic origins. The region is also in the Atlantic Hurricane belt and therefore exposed to severe weather in the form of Tropical Cyclones on an annual basis. For six months of the year most islands in the region are in a state of heightened awareness for these phenomenon and although preparedness efforts are understandably significant, tropical cyclones and their associated secondary hazards still result in loss of life as well as damage and loss to countries.

Anguilla is a technologically advanced country, internet access is pervasive and reliable, cellular penetration is for all intents and purposes 100% and radio listenership has remained high even in the age of the internet. Anguilla therefore possesses the basic technical infrastructure necessary to create an Early Warning System that had the ability to reach majority of the population if properly implemented for the greater part of a decade.

This opportunity was seized upon by the Department of Disaster Management in 2007 when as a newly formed Government Department mandated to mitigate against, monitor and warn the Anguilla public of impending hazards, the Department invested in and created the first Common Alerting Protocol (CAP) based Early Warning System in the Caribbean.

2) Origin of the Anguilla Warning System

The Anguilla Warning System (AWS) was born from the mandate of the Department of Disaster Management with its existence and operation set out in legislation, making it a legal requirement of the Department of Disaster Management to operate. The Early Warning Regulations of the Disaster Management Act states:

“ The Early Warning System shall be used to alert persons, households and businesses of imminent or active threats to persons and property in Anguilla or an area within Anguilla.

(2) The early warning system shall not be used for the dissemination of any of the following—

(a) any message of commercial nature;

(b) any message of political nature; or

(c) any message relating to unofficial or private safety business.

(3) The Director is responsible for ensuring—

(a) that Anguilla has adequate monitoring and forecasting capabilities in respect of threats from all hazards;

(b) the maintenance of adequate and functioning warning and alerting systems; and

(c) arrangements are in place to ensure every community at-risk is aware of the meaning of the hazard alerts and the accompanying safety messages. "

Disaster Management Act Annex 6 Early Warning Regulations Section 2

The fact that this is a legal responsibility has its advantages and disadvantages. The obvious disadvantage being it puts tremendous pressure on those legally responsible for warning the public. When things go wrong and lives are lost it can mean that legal liability may very well fall upon the Department if it can be proved that warning was insufficient or inaccurate. On the other hand, having the Early Warning System mandated in law simply means that funding and resources for its operation are guaranteed. This is a massive advantage and ensures that the AWS did not become "just another project" which could be out prioritized into nonexistence.

Key milestones in the AWS development process were:

(1) The creation of a Department of Disaster Management was a clear signal from the Government of Anguilla that there was an expanded focus on hazards and their mitigation beyond the usual scope of Hurricanes and Tropical cyclones. This was further expanded with the adoption of a Comprehensive Disaster Management (CDM) Policy.

(2) The Disaster Act of 2007 did more than simply establish the Department it also definitively established the Anguilla Warning System as the means by which the Anguillan public was to be warned of impending hazards.

(3) The then Director of Disaster Management was then tasked with determining exactly what type of system would work best in Anguilla considering factors such as :

(i) Availability of internet – With practically 100% of the population having access to stable land line and / or mobile internet this consideration was then simply about what type of early warning system would best be able to leverage the advantages of a pervasive, stable internet backbone.

(ii) Access to technology and media – At the time personal computers were in their ascendancy and a very high percentage of the population either owned or had access to a personal computer or laptop. In addition traditional media (broadcast radio and cable television) had similar levels of penetration and consumption.

(iii) Social factors – Social factors played a large part in determining what dissemination methods were ultimately chosen. If you are designing a system to warn the public then it has to be able to do so via means that are widespread and are a relatively routine part of person's lives. An example of this is the consideration that many older more vulnerable persons are more likely to receive notification via broadcast radio than the internet.

(iv) Expandability and system maintenance – An Early Warning System is by its very nature an evolving system. Technologies change and improve rapidly. Further an Early Warning System is not one that is projected to be used regularly but has to be 100% reliable and available when called into action. The system chosen must therefore be easy to expand, easy to maintain, cost effective and built on technology that is ultra-reliable.

(4) A Common Altering Protocol based system was chosen based on the requirements for early warning and the need for a consistent, highly integrated warning system. The advantages of CAP over other approaches include :

(i) CAP is Open Source - This means that the protocol can be used free of royalties and more importantly the standard is available to use in software and hardware development.

(ii) CAP is purpose built for warning - CAP is an XML based standard created expressly for the purpose of warning. It is therefore easy to read and understand for Disaster professionals and is lightweight enough to be easily transferred over data networks. The specifications also allow multimedia to be attached to alert messages in order to supplement text and there are also built in authentication and security measures of ensuring the authenticity of alert messages.

(iii) CAP promotes an "Activate once, Activate everything" methodology – Early Warning Systems have traditionally been disjoint, separate collections of random dissemination devices CAP allows one message to be sent and activate many systems simultaneously making it possible to ensure consistent message delivery across all mediums in the shortest possible time.

(5) A protocol was developed in order to define users, use cases and general operation procedures for the Anguilla Warning System. This policy/protocol is critical in order to define critical operational aspects of the system in order to ensure its integrity and safeguard its reputation. One critical example of this in the policy is the fact that the Anguilla Warning System cannot be used for messages of a commercial or political nature. Another aspect defined in the protocol was the frequency and parameters of the testing performed on the warning system. Relatively frequent testing of a warning system is critical as warning systems are not (hopefully) activated on a regular basis but must still achieve a 100% uptime. Regular testing is also good for the public as it

keeps the warning system in their consciousness and reinforces hazard awareness and public education efforts.

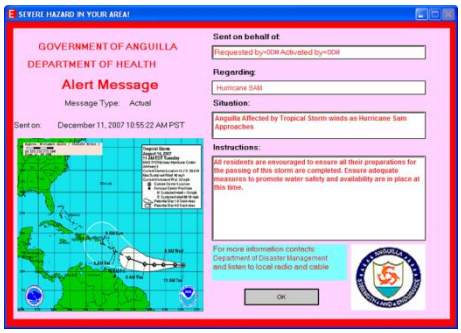
Initial results - The Anguilla Warning System as it developed

Initially three dissemination methods were chosen for the Anguilla Warning System in 2007. The personal computer program the "BAMBOX", FM Broadcast Interruption and RDS warning receivers. The three dissemination methods are presented below:

RDS Warning Receiver

The Early Warning Alert Receivers are (Radio Data Service) RDS compatible FM radio receivers which use a built in siren and its large LCD Display to deliver alerts automatically when they are issued. The RDS receiver can monitor the radio station for alerts and activate itself even if it is in the power off position! It also contains a battery to provide power when mains electricity is lost. It is a self-contained warning device which does not require internet service to function.

BAMBOX Alert computer program



The BAMBOX is an internet based alert client. Simply put this is a piece of software freely downloadable from the internet which once downloaded will deliver alerts by "popping up" in the foreground to deliver the warning message. It is capable of delivering both sound and images in addition to the warning text

FM Broadcast Interruption

Broadcast Interruption is exactly as its name implies, on receipt of a Level III warning message (Warnings are given levels based on the nature and impact of the hazard) the AWS automatically commandeers the radio broadcast long enough to broadcast the Emergency alert tone and then a Text to Speech translation of the warning message. What makes this capability particular interesting is the fact that it is automatic and no interaction is needed by the Radio DJ to make the broadcast happen.

In 2007 these three dissemination methods represented a successful implementation of an early warning system. Email and Smartphones had not yet penetrated to the general public in Anguilla to the extent that they are today. The tablet market was practically nonexistent and desktop computers and laptops were the most common means of consuming the content of the internet. It is to be noted that a limited amount of RDS receivers were purchased and these were placed with First Response Agencies and other critical Government agencies and as such their impact on the general public was limited. The general public was educated about the AWS and its two most public dissemination methods (the BAMBOX and the FM Broadcast Interruption) and the AWS was officially born. These dissemination methods had somewhat limited reach. The FM radio Interrupt was only going to be useful to an individual who was listening to the radio on that particular station at the point the alert was received and the BAMBOX although available on the internet for free, required some user interaction to actually download and install. It was therefore clear that the system needed expanding to incorporate additional devices as well as other dissemination means.

By 2009 the technological landscape had radically changed. Personal computers were on their way out. Smartphones (particularly BlackBerry devices) were prevalent and hence email surged in popularity and was now present in the general domain. By 2010 desktop computers were relegated to desks at work and most people consumed internet on their smartphones and tablets.

This prompted the addition of public email notification to the AWS in 2009 where anyone could sign up to receive alerts via email. This was an important addition because people were becoming more and more attached to their phones on a daily basis and therefore email suddenly became both much easier to check and always available.

A BlackBerry app soon followed which took advantage of the fact that by 2010 nearly all cellular phones in the hands of the public were smartphones and more specifically BlackBerries. This meant that persons were now permanently attached to a warning device and greatly expanded the reach of the Anguilla Warning System.

Iterative improvements were made to the AWS during the subsequent years. The UNDP R3I's project sought to replicate the Anguilla Warning System across several Caribbean islands with limited success. However the Anguilla Warning System did benefit from the project in some key ways:

- A Public Awareness and Education campaign was an important part of the R3i project and helped to further raise awareness of the warning system locally as well as regionally. Public Outreach and Education materials were developed and used to re-invigorate the local Public Education campaign.
- Expansion of the FM broadcast interrupt system due to the acquisition of six (6) additional broadcast interrupt units.
- Addition of two (2) new dissemination methods: NOAA weather Radio alerting and Marine Alerting.

The addition of NOAA weather radio alerting was significant simply because NOAA weather radios are cheaper than RDS receivers and widely available to the public. In fact some commercial FM radios have NOAA weather radio capability as do most modern VHF marine radios sold in the United States. Marine alerting was also an important addition as Anguilla is a seafaring society with several fishing villages.

3) What were the main challenges or difficulties that you encountered relating to the implementation of the EWS

The potential challenges in implementing a CAP based warning system are numerous. Technical, Regulatory and Logistical issues are all potential barriers to the successful implementation of the system.

The immediate logistical challenge in implementing an Early Warning System is garnering support from both the administrative/political powers and the general public who must be convinced of the system's potential value to them. Only when buy in is obtained can we dare to approach the question of financing for the system.

In Anguilla's case due to the unique situation where the Department of Disaster Management falls directly under the Governor's Office, very little political intervention was necessary in order to gain support for the Warning System. In fact, as previously mentioned the existence of the AWS and its purpose was mandated in the Disaster Act from its inception simultaneously reducing the need for excessive political intervention as well as virtually guaranteeing the sustainability of the system.

The question of public support is significantly more involved. If the public is not educated about the system and its potential benefits or they do not feel part of the process then their

support for the system will be very difficult to obtain in the future. The public must be given the opportunity to present their views on what means is best suited to warn them and how best to incorporate the warning system into their everyday lives. It is also important to keep the system in the public's vision and consciousness.

Technical issues are also bound to arise with any new system. In the case of a warning system these issues can be very detrimental to the system and its reputation. Consider the scenario where a tsunami siren fails to activate simply because of a dead battery? This type of simple failure can be rectified post event for many systems without any serious loss but in the case of a warning system that simple failure can have a very real cost. Even if no lives are lost due to a component failure it can serve to undermine the trust the public has in the system's ability to warn them. The plain and simple fact is that a warning system is only as good as its reputation and ensuring uptime is central to maintaining this.

Another challenge that was encountered is simply the speed at which technology and societal trends change. The kind of technology and the way people interact with technology has changed drastically in a few short years. Changes in social trends and technological advances make it difficult to predict the usefulness of particular dissemination methods over extended periods of time and therefore necessitate some system of continuous review.

Finally it may be prudent to note that support from some media partners for the system has proven to be a real challenge. Usually telecommunications (cellular) providers and terrestrial television (cable tv) providers fall into this category. The idea of having alerts sent via SMS (text messages) has been around since the introduction of the system in 2007, nearly a decade later in 2016 SMS alerting is notably absent. While the arguments against utilizing SMS for warning have merit, SMS is ubiquitous and available on every cellular phone sold today. The arguments against utilizing SMS for public notification stem from the fact that it is not a broadcast technology and therefore is poorly suited for mass alert dissemination in its purest form, for example there is no built in guarantee of delivery or delivery time. While the technical aspect of SMS warning is difficult, it is by no means impossible and systems have been invented which relieves most of the congestion and delivery concerns through clever usage of geolocation and databases. The major obstacle to its implementation is simply the fact that most providers are not obliged to do it and more importantly, they are certainly not obliged to do it free of cost.

What was done to overcome them?

Anguilla was the first country in the region to implement a CAP based early warning system and therefore like all pioneers encountered difficulties that can be attributed to venturing into the unknown. The initial challenge of garnering public support for the warning system was addressed by:

(i) Educating the public about what the warning system was, its capabilities, limitations and what problems it was expected to solve was a critical step in

addressing the issue. The more involved the public is in the design of the system the more they take ownership of it and the more confident you can feel about the system and the security of its assets.

(ii) Implementing a comprehensive education programme about the warning system. This is different to the first point in that a programme implies dedicated resources and continuity. The public has to be continually engaged in the warning process. Stakeholder consultations have to be held to discuss changes in the system, address concerns and educate the public about what warnings mean and the actions they are expected to take. For example it is simply not enough to tell the public that when the siren goes off it means a tsunami is coming. Public Education is required to ensure they know where to run, what routes are safe and what to take with them.

(iii) Keeping the warning system in the public view. Regular, scheduled testing helps to keep the public cognizant of the warning system's presence. It is also important to use the warning system in national and regional exercises as much as possible in order to promote visibility but also to give some sense of how the system would operate in an actual emergency situation.

Inevitably technical problems started to plague the system after a while due to the fact that the relevant technical expertise to manage the system and its components were not originally catered for. The Department of Disaster Management therefore addressed this issue by employing a former System Engineer full time as the Emergency Communications Officer with responsibility for the Anguilla Warning System and its operation. This approach allowed the development of the warning system to continue and take advantage of the best technologies as they became available.

This also was a strategy for dealing with the problem of rapidly changing technologies and social trends. It is impossible to predict sometimes how much the technological landscape can change in a short time however the change is more gradual with some types of technology (usually older established media technologies such as broadcast radio). Whatever the case constant evaluation of the available means of dissemination versus desired means of alert dissemination is required. Continued investment is therefore needed to change the public facing side of the Warning System to ensure that it is adding those methods that are current, feasible and have the most potential impact while decommissioning those that are outdated and have limited impact.

4) Sustainability and future replication:

What measures have been put into place to ensure sustainability?

As indicated previously the single most important element of ensuring the sustainability of the Anguilla Warning System is the fact that legislation requiring its operation was introduced. Legislation in support of the system ensures recurring financial support which is often the biggest stumbling block to the continued existence of any system.

The acquisition of the required expertise to manage the system is also a key component of ensuring sustainability. In Anguilla's case the required knowledge was found within the Government's Information Technology Department. The Department of Disaster Management acquired the necessary personnel to ensure that the system could be managed full time as a priority thereby ensuring that system downtime was minimized.

Anguilla has shared their expertise and experience in Common Alerting Protocol based Early Warning Systems with the Caribbean most notably through UNDP projects which seek to replicate and improve on the earliest iteration of the Anguilla Warning System. The natural benefits of expanding CAP early based warning systems through the region include improved access to resources and capacity building. This in itself is a means of ensuring the sustainability of the Anguilla Warning System as well as other CAP based warning systems in the region.

What are the plans/possibilities for future replication of EWS systems in your country?

The Anguilla Warning System is designed to be inclusive. Future systems whether at the community or national level are required to integrate with the Anguilla Warning System to ensure consistency and reliability. Currently no other documented systems exist but there is potential to add monitoring devices to the system via other projects and programmes. This includes the possibility of creating a pond level monitoring and early warning system to monitor the levels of the many salt ponds in Anguilla during excess rainfall events. This is particularly important in Sandy Ground and East End. Both of these areas are at extremely high risk for flooding and flash flooding due to storm surge and pond breaches when the water levels rise. There are intentions to install automated pond gauges to measure the water levels in the ponds and alert when they are exceeding their safe limits. These gauges will be integrated into the Anguilla Warning System which will create automated alerts based on the levels of the ponds.

The installation of automated weather stations is also a potential avenue for expansion of the AWS. Already this year a weather station was procured by Disaster Management and installed at FLOW telecommunications in order to test if it could be used to trigger automatic alerts via the Warning System for excess rainfall and high winds.

Finally, the Anguilla Red Cross has secured funding for voice capable sirens for two communities in Anguilla who are at particular risk for tsunami. While these siren systems can be activated locally “on site” they too are designed to be CAP compliant and hence compatible with the Anguilla Warning System. This represents a significant milestone for the AWS as siren notification will be added as an alert dissemination method through this project.

SECTION B: LESSONS LEARNED

5) Training and Capacity Development

List lessons learned with regards to training and capacity development

As it applies to training and capacity development the major lessons learned throughout the entire process can be summarized as follows:

(i) Training is vital and never ends. Since a Warning System is not often used it means that operators have little experience activating it outside of exercises and training. Training therefore must be relevant and frequent enough to ensure that the operators know what to do when they are required to activate.

(ii) Training takes resources, both in terms of time and finance. This fact implies that rather than focusing on holding a training workshop every once in a while it is critical to implement a training programme complete with resource and budget allocation.

(iii) Training is the responsibility of the agency which "owns" the warning system. The agency which takes ultimate responsibility for the Warning System is the agency that has responsibility for implementing the training programme. It is therefore important that this agency be influential enough or has the support of the highest level of government to ensure that the training programme is funded and effective.

(iv) Capacity development is crucial to the sustainability of a warning system. The reality is that staff turnover is high in Anguilla, even in the case of the public sector. While access to the system must be by design restricted potential operators must be trained. Technical support for the warning system must be identified and developed to ensure its continuity.

Lessons learned in raising national or community awareness about EWS. What did you learn? How did you apply it? What would you change/recommend is done differently?

Community awareness of a warning system focuses on two (2) key points. Firstly the community must be involved in every part of the warning process and then they must constantly be reminded of the warning system and its benefits to them.

In the case of Anguilla, community involvement was not necessarily sought in the initial stages. This led to the position of having to educate the public about the system after it had already been planned to a large extent. This is not the ideal situation and going forward this experience was valuable in recognizing the need to garner community buy in for a warning system before the implementation process. Exercises or even actual events where the

warning system can be demonstrated to be effective at protecting lives and property will go a long way to garnering the public's support. The best strategy remains however to engage the community at the earliest opportunity in order to:

(i) Introduce them to the warning system and clarify its purpose and usage. This is critical to garnering their support for the system and its physical components which may have to be placed in the community.

(ii) Collect information about what dissemination methods they currently use and what methods would enhance warning in the community. The warning system should always be sold to the community as an enhancement of their current systems as opposed to a high tech replacement. This approach potentially reduces backlash from community members who are entrenched in the more traditional ways of doing things. This traditional knowledge is not something that should be ignored as often it is the community who knows what works best from tradition and experience. A simple example of this is the church bell which is historically used to inform communities of special events and impending danger. The meanings of the particular tones and patterns of the church bell are entrenched knowledge in community passed on from generation to generation.

(iii) The community must also be kept actively engaged with the warning system. It must be regularly presented to them so that it remains in their consciousness. The benefits of the system must continually be preached and more importantly demonstrated to them. This can be done in a myriad of ways:

    (a) Since the system is designed to be hardly used, visibility means that it has to be constantly tested. Regular testing is important to allow the community to constantly be reminded of the system's presence and help with troubleshooting. A community that values its warning siren is definitely going to call and report its failure if it does not activate during the time it is scheduled to do so.
    (b) Allow the community to have the warning system activated for its exercises and simulations. This is an important concept that further promotes ownership and warning system awareness. CAP based warning systems like the Anguilla Warning System fully support location based (geofenced) alerting. This means it is possible to activate warning for a particular community or parish while not necessarily interrupting the rest of the country from their regular activity. This powerful capability means that there should be no fear in including warning system activation in community level exercises. In Anguilla practically all community disaster exercise or scenarios are started by the Anguilla Warning System including the CaribeWave annual tsunami exercise.
    (c) Direct engagement with the community about the warning system is also critical. The Anguilla Warning System is in a state of constant change and development. The public must be kept updated about what features have been added, expanded or even removed. Focused activities about the warning

system in the communities are a way of keeping the public informed and interested in the warning system and can include evening seminars, “whistle stops”, community meetings and radio or television programmes. Whatever methods are chosen the point remains to meet the community where they live to discuss the warning system. There is no more effective driver for community support than engaging the public in this way.

Lessons learned in training operators and users of the system as well as related personnel. What did you learn? How did you apply it? What would you change/recommend is done differently?

A lot of the issues around training operators and users of the system have been discussed previously. Several key points regarding training in general apply here as well, including resource and time requirements as well as ownership. Of particular note when training operators and users of the system:

(i) Train several layers deep. A warning system that a few persons can utilise if called upon is potentially dangerous. Appropriate numbers of personnel from relevant agencies and organisations need to be identified and trained to utilise the system if necessary. It is important to differentiate between training and granting access. Not everyone who is trained needs to be granted access on a permanent basis, however it is imperative to train and give access to sufficient people to cover personnel changes (particularly in the traditionally “shift” based first response agencies).

(ii) Train often enough to ensure that users can successfully activate the system when called upon to do so. Actual activations are hopefully rare and may be months apart, training is the only way that users can gain the experience necessary to be able to reliably activate the system if they are called to do so.

(iii) Persons are traditionally reluctant to operate the system. Once persons become acutely aware of the responsibility associated with the system as well as its capabilities there may be some reluctance to actually be the one to “pull the trigger”. This can be mitigated by having a clear protocol and written structure by which they can be guided. Another strategy to combat this reluctance is to break down the responsibility for activation into multiple stages and assign responsibility only where needed. In the Anguilla Warning System the responsibility is divided into three classes REQUESTER, AUTHORISERS and ACTIVATORS. In this way the REQUESTERS have the authority to requester activation the AUTHORISERS act on the request and guided by the Warning System Policy decide whether and activation is required. If it is determined that an activation is required then an ACTIVATOR is instructed to perform the actual activation. This scenario removes a lot of the responsibility for activation from the ACTIVATOR who simply acts under instruction from the AUTHORISER.

6) Institutional strengthening

List lessons learned/recommendations relating to how best to strengthen local level institutions/governance so they can incorporate and address early warning capacities?

Local level institutions and local governance can incorporate and address early warning capacities in many ways. Key among these are:

(i) Become involved in every stage of the warning process including its design and operation. The more involved the agencies are, the more likely they are to exhibit ownership and provide support to the system. The more relevant agencies and institutions present at the planning stage, the better chance there is of a warning system being developed that meets the majority of the needs of those who will be required to operate it.

(ii) Embracing a single warning platform in order to ensure interoperability and consistency in warning. There is often the temptation (especially among first response agencies) to insist on dedicated private communication systems as well as individual specialised systems for notification. A single system is simply more cost effective to manage than multiple diverse systems for which interoperability will almost always be a challenge.

(iii) Maintain and support the warning system policy at all levels. This includes ensuring legal and regulatory support for the warning system at the highest level.

7) Embedding DRR at the Community Level

List lessons learned/recommendations relating to strengthening of DRR and early warning capacities at community level.

Strengthening DRR and early warning capacities at the community level focuses on the educating of the community about DRR and early warning as well as supporting all community level organisations and efforts focused on risk reduction. The key lessons to take away from Anguilla's experience would be:

(i) Community support has to be earned through early inclusion and adequate consultation. Communities are the lifeblood of small islands and each community has its own identity and community leaders who have great influence on all those who live there. It is therefore important to identify and target these community leaders in order to gain the support necessary for your warning system to achieve its desired objective of protecting the public.

(ii) Government, Disaster Management and First Response agencies must thoroughly support community level DRR activities and groups. Community Emergency Response Teams (CERT) have helped to greatly raise awareness of the warning system through its inclusion in their community level exercises and activities.

(iii) Educating the public about the risks they face and how to manage and mitigate against them is critical to enhancing early warning system capacity at the community level. CERTs can be useful in this regard however the role of the Disaster Management office in this process cannot be ignored. Not only is it important to educate the community it is critical to that this be an ongoing process which necessitates a high degree of planning and resources commitment.

(iv) As previously identified, it is important to tap into the wealth of knowledge the community has about their individual practices for early warning. It is critical to identify and utilise this traditional knowledge to incorporate into the early warning system in order to gain support for and strengthen the warning system. In most cases traditionally systems can be readily made CAP compliant with a little innovation and investment, for example the traditional church bell can be supplement with an electronic equivalent which would maintain the manual function and add CAP compliance.

SECTION C: MORE STORIES

In 2011 Anguilla gained recognition as the first International community to be certified as "TsunamiReady". The TsunamiReady designation was achieved because Anguilla had demonstrated tremendous ability to receive and propagate tsunami threat information to its residents and communities in a rapid, consistent manner. The Anguilla Warning System is a key part of this equation as it allows tsunami threat information to be distributed to the entire island in a myriad of ways in minutes. In a time sensitive emergency situation such as a local or regional tsunami the ability to activate the Anguilla Warning System from any internet connected device to deliver warning within sixty (60) seconds across all media is critical to the survival of the residents of Anguilla. TsunamiReady does not mean that Anguilla is tsunami proof it simply indicates that Anguilla is in a very good position to mitigate against unnecessary loss of life due to tsunami events.

It is for this reason that every tsunami exercise conducted is prefaced with warning on the Anguilla Warning System. This ensures that the public is familiar with the format of the message and gives them valuable experience in testing its reception and their corresponding actions.

SECTION D: NEXT STEPS

8) DRR Discourse

How has the discussion of EWS in country shifted? What are the next steps to continue this general direction?

In Anguilla the discussion of whether the Anguilla Warning System was a necessity or not simply never occurred. It began as the vision of the Department of Disaster Management and with legislative support it became a reality. Since then it has been adopted by First Response agencies and the public as the dedicated platform for disseminating time critical public safety alerts to the residents of Anguilla. Its' impressive up time record spanning almost a decade, its reliability and flexibility has seen the Anguilla Warning System grow and improve in its dissemination capabilities and in public confidence.

The next steps for the Anguilla Warning System therefore focus on the expansion and upgrading of the system. Several exciting new initiatives and dissemination methods are planned. In addition multiple language support for alert dissemination is currently being developed to better address the warning needs of the growing Spanish population on the island. Partners such as the Anguilla Red Cross are helping expand the system by installing warning sirens in vulnerable communities. Pond level monitoring as well weather monitoring for automatic alert dissemination is also being considered for implementation in the near future.

Public education activities continue unabated and efforts in this area continue to bear fruit. Public confidence in the warning system is high and this helps to assure its place in the early warning process for all residents and visitors to Anguilla. Best of all the warning system's success continues to inspire other countries to replicate it and in doing so strengthens early warning capacity in the Caribbean as a whole.

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SECTION E: ADDITIONAL INFORMATION

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SECTION F: APPENDIX

Alert Dissemination Methods

Below is a list of common alert dissemination methods associated with CAP based early warning systems. The table gives potential advantages and disadvantages to the implementation of each method

Dissemination Method	Advantages	Disadvantages
Computer Client	-Easily Accessible -Minimal Cost -Provides Maximum information	- Requires internet access - Effective only when computer is powered on and individuals are utilising it - Declining home computer use - Requires individuals to download
Mass Email	-Easily Accessible -Minimal Cost -Provides same level of information as Computer Client -24 hour access as a result of increasing smartphone penetration	-Requires Internet access -Requires individuals to sign up. -Requires individuals to check the email to be alert.
Smartphone Applications	-Increasingly easier to access -Minimal Cost -Provides Maximum Information -24 hour access as a result of increasing smartphone penetration -Able to utilise sound, vibration and flashing lights to alert the user of incoming alert	-Requires Internet access -Require individual to download and install application

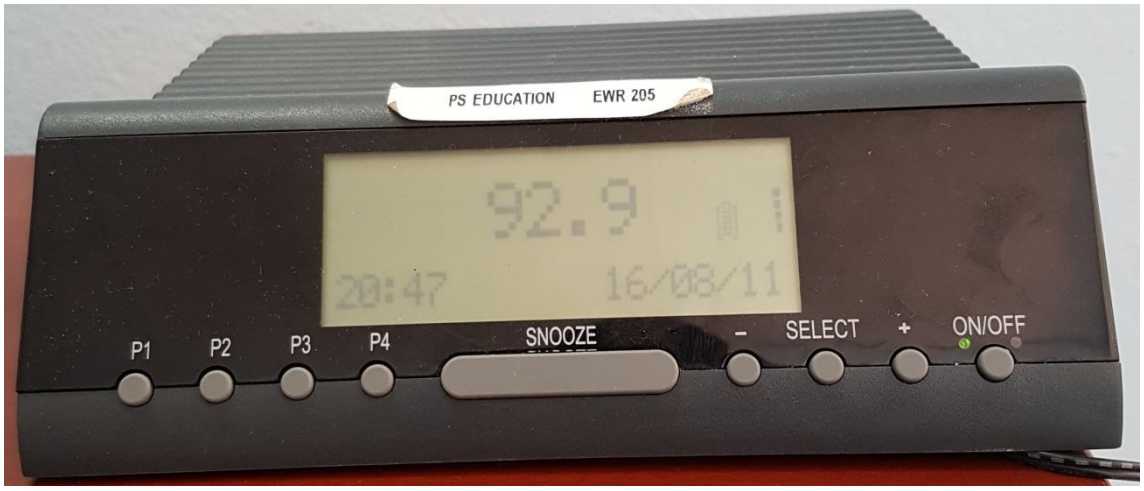
Broadcast Interrupt Devices (Radio and Television)	-Broadcast medium (ALL individuals will be alerted once in vicinity) -Limited Information delivered (Radio)	-Requires internet access -Can be relatively costly to fully implement (Multiple FM stations and TV stations) - Requires media partner support -Declining use of terrestrial television broadcasting can negatively affect alert reception.

Specialized warning receivers (RDS , Marine , Weather)	-Broadcast medium (ALL individuals will be alerted once in vicinity). -Limited Information delivered -Cost effective receivers. -Since receivers are special purpose for the reception of alerts they usually feature advanced alerting mechanisms including but not limited to : loud sirens, automatic tuning to alert stations, battery backup and auto power on.	-Requires internet access -CAP decoders and RDS equipment can be costly
Warning Sirens	-Broadcast medium (ALL individuals will be alerted once in vicinity). -Limited Information delivered -Most proven method of alert delivery	- Requires internet access - Tremendous implementation and maintenance costs. - Public support necessary - Noise pollution concerns
Mass SMS	- Available on all cellular phones Limited information delivered - 24 hour access as a result of increasing smartphone penetration	-requires carrier support -can be costly to be implement -SMS can be unreliable due to network congestion issues -on time message delivery cannot be guaranteed

Cell Broadcast	-Broadcast medium (ALL individuals will be alerted once in vicinity). -Much faster alerting than SMS due to broadcast nature -largely immune to network congestion -Available on most cellphones -Limited information delivered -24 hour access as a result of increasing smartphone penetration	-can be costly to implement - Requires carrier support - Not available on all phones. Most phones have cell broadcast disabled by default

Pictures

Picture 1 : Showing a DASDEC Radio interrupt unit being prepared for installation into a FM radio station.



Picture 2 : Showing RDS receiver in active use. The unit functions as a normal clock radio until an alert is sent.

Picture 3: Showing a NOAA weather radio receiver. These units offer slightly less functionality than RDS receivers (they cannot display alert text) but they do provide alert audio and are very affordable.

Picture 4 : Showing staff and students of Adrian T Hazell Primary School assembling at their evacuation site during the CaribeWave 2016 tsunami exercise

Picture 5 : Showing staff and students of Central Baptist School at the Tsunami Assembly point during the CaribeWave 15 tsunami exercise.

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