"It's Falling from the Sky but Not Hitting the Ground": Drought in the outer atolls of the Marshall Islands in 2013

"You see that rain out there?" asked meteorologist Chip Guard, looking up at the sky above Majuro in the Marshall Islands. "It's falling from the sky but not hitting the ground. We call that virga. You know where we see virga? In deserts."

The dry season annually hovers over the low-lying atolls of the Republic of the Marshall Islands (RMI) from December to April. In late 2012, the months leading up to the dry season were much drier than normal in the northern atolls of the RMI, known as the outer islands. Wotje and Utrik Atolls, two of the outer islands, received only 28 percent and 25 percent, respectively, of their normal rainfall for September through November.

"We were looking at the seasonal outlook for rain and it was saying by January, February, March, it's not looking like it's getting any better," recalled Reggie White of the National Weather Service Office (WSO) in Majuro. The WSO was receiving rainfall observations and forecasts from the Pacific ENSO Applications Climate (PEAC) Center, the Weather Forecast Office (WFO) in Guam, and multiple weather observation stations in the RMI. All signs pointed towards a dry spell that was unlikely to let up for several months.

A dense strip of clouds that extends across the Pacific just north of the equator – visible on most satellite images of earth – called The Intertropical Convergence Zone (ITCZ) supplies precipitation to the RMI. There is also an area of low atmospheric pressure called the Tropical Upper Troposphere Trough (TUTT), in which clouds often form and showers often follow, that supplies additional rainfall to the RMI. Changes in the location or size of the TUTT and ITCZ can cause a decline in rainfall, such as the drought developing in late 2012.

In the past, droughts had crippled islands in the region, such as the drought of 1983, which caused widespread suffering and some deaths in nearby Micronesia; and the drought of 1998, during which it was necessary to ration water in the RMI but early warning eliminated much of the potential suffering. The desert-like conditions Guard described are not unfamiliar to the Marshallese people, but are devastating all the same. By the beginning of 2013, precipitation in the outer islands was already at a huge deficit.

"You have to realize that the people from the outer northern islands were calling in and saying, 'We are in need of water,'" said White. In January 2013, 13 local governments in the outer islands requested assistance from the national government in dealing with the drought. The ground was cracking and the leaves were turning; the lower atmosphere became drier and the groundwater saltier.

"Basically drought is sneaky. Drought kind of sneaks up on people. It comes slowly and if you're not preparing yourself for it, you can find yourself in deep trouble because the rain can stop just almost instantaneously," said Guard. The outer island atolls depend on rainwater to refill their tanks and recharge their aquifers, which dwindle quickly when the rain stops.

In situ indicators, such as salty groundwater, pointed to drought before it was observed in technical meteorological measurements. The National Weather Service has observation stations on only 8 of the 24 atolls that comprise the RMI, so they must depend on satellite information and experiential observations from other atolls to fill the gaps.

"We could only get scientific measurement from those observation stations but to get a better feel on the neighboring atolls, which don't have equipment and rain gauges, we were asking them, 'So how much water is in your tank?'" said White. "The well water is much more brackish than it was two months ago. It's getting saltier. At the cleaning, they have only now a foot of water in their water tank. So those types of information we were collecting and trying to make sense of it and trying to relate it to an actual rainfall in one of the neighboring islands that we had an observation point on."

White and his team in Majuro were communicating with outer islands through a new tool called the Chatty Beetle, which had been incorporated into the operations of the WSO a couple years earlier. The Chatty Beetle is a text-based alert system that rings loudly until an incoming message is received, and sends a confirmation back to the sender. "That allows us to communicate via satellite with the outer islands using short burst messages so we can pass rainfall information back and forth and also issue warnings and things like that," said Guard.

The outer islands' request in January, and the subsequent exchanges between the WSO and outer islands, illustrated the importance of recognizing experiential knowledge, embedded in the local social and cultural setting, alongside technical knowledge. Later that month, the WFO in Guam began issuing warnings about the severity of the drought in the region and predictions on what was to come.

KEY MESSAGE

Know your social and cultural setting – understanding community values, aspirations, and perspectives, as well as the sensitivity of assets critical to and the adaptive capacity of the community will drive adaptation from a grassroots level.

"On the 5th of February we issued a Drought Information Statement," said Guard. This comprehensive bulletin included a synopsis of the conditions and impacts, including rainfall, temperature, and coral bleaching threats, as well as a 5 to 10 day forecast of those variables. The RMI government used this drought information statement to develop drought response planning.

The national government declared a state of emergency on April 19th. During the first 3 months of 2013, less than 4 inches of rain fell on many of the outer islands. At the Wotje weather observation station, the driest of the weather stations in RMI, less than an inch of rain total was recorded from January through March.

On the heels of the emergency declaration, assessment teams were sent to the outer islands, led by the National Disaster Management Office and supported by the US Agency for International Development (USAID), the Office of Foreign Disaster Assistance (OFDA) and the International Organization for Migration (IOM). The assessments found that groundwater was too salty and people were suffering associated health problems including gastritis, diarrhea, vomiting, abdominal pain, fever, and hepatitis.

"They're using this groundwater and it's always kind of salty," said Guard. "But you rarely hear the outer islanders complain about water quality, they just drink it. But one day they can drink it and the next day they can't during these severe droughts. The concentration of salt gets too high and, you know, they've got about 48 hours before people start getting very sick and some people can die. So it's very critical that we provide

the government enough information, far enough ahead of time, so it can deliver the water resources that are necessary."

Boatloads of bottled water were sent to the outer islands, along with several individual desalination and reverse osmosis units to produce fresh water on the atolls most in need. Transporting supplies and equipment, both Guard and White emphasized, is the most costly part of responding to drought.

KEY MESSAGE

Direct attention to the alignment and coordination of activities – integrated program planning and product development will maximize efficiency and effectiveness (by minimizing gaps and overlaps and maximize consistency of information and messaging), as well as enrich potential for local to regional capacity development.

"You have to realize that in the Marshall Islands, the biggest challenge is the distance between islands," said White. "All that equipment in totality might only cost a few dollars but the trip you make from here to there is very expensive because you have to pay for fuel and to charter the ship." The earlier and more specific the forecasts can be, the more efficient the response can be. Ensuring that the efforts of response groups – from multiple levels of government, communities and other organizations – are aligned together and informed by forecasts and the needs of the community make the response all the more effective.

The rain returned to the outer islands in June, though the national state of disaster was extended on June 7th for another 30 days. The atolls still faced significant hurdles ahead. Many of their crops had withered in the drought. "The coconuts have dried up; the breadfruits have dried up; the taro has dried up; the tapioca has dried up," said Guard. "It's going to be 8 to 10 months before the food sources can come back." Plants were sent to the outer islands, including sweet potato and dry land taro from Fiji, as they set to replanting their gardens.

KEY MESSAGE

Commit to robust and sustained monitoring and assessment – the maintenance and expansion of existing monitoring networks will lead to an improved ability to understand and predict a changing climate and associated impacts over both the short and long terms.

Following the drought, the RMI continued monitoring climate conditions and training outer island residents in drought recognition and response. More comprehensive monitoring networks for rainfall and other climate variables – all the way from Utrik down to Majuro – improve prediction of future droughts. As the observational knowledge of on the ground conditions from the outer islands proved invaluable, WSO Majuro and WFO Guam continued training communities on when and how to communicate drought indicators. That way, White explained, when the next drought creeps up, the response can be earlier and more effective.

The Pacific Islands Climate Storybook can be found at: http://pacificislandsclimate.org/csdialogs/
Climate Stories can be found at: http://www.pacificislandsclimate.org/csstories/

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