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WHEN MEASUREMENTS MATTER

Africa: Flood Warning and Ecosystem Decisions

Monitoring climate change effects and degradation in water quality

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Ecosystems found in rivers, deltas, and other bodies of water have changed as a result of human activity and natural elements, and these changes have had a direct effect on these fragile ecosystems and the lifeforms within. In Africa, including in Angola, Namibia, and Botswana, the Okavango Delta is one of the regions where researchers and government officials hope to gain a greater understanding.

Nearly 70% of the water that arrives in the Okavango Delta originates in the highlands of Angola. As the water soaks into the underlying Kalahari sand, the rate at which the delta is recharged becomes crucial and needs to be monitored closely. Without the steady recharge of water, the Okavango Delta will cease to exist. To ensure the protection of wildlife and the human population in the region, these water flows must be carefully monitored. Reliable technology that can collect meaningful data for decision makers is vital to help them manage the water in the most efficient way.

Wars, inaccessibility, and insufficient technology have hampered past attempts to monitor rivers connected to the Okavango Delta. To obtain critical data, the following questions about the future of the delta need to be addressed: How will people living downriver be affected by a potential new dam construction? How much water can be abstracted from rivers without impairing the ecological functions of the Okavango Delta?

Obtaining the information necessary to answer these crucial questions enables decision makers in the government to help broaden community knowledge of river hydrology and ecosystem functioning. Monitoring will also help improve detections in water

Case Study Summary

Application
Making ecosystem decisions by monitoring the effects of climate change and degradation in water quality

Location
Okavango Delta, Africa

Products Used
CR850

Participating Organizations
National Geographic Okavango Wilderness Project

Measured Parameters
Water quality, water discharge, water depth, surface velocity, wind, temperature, barometric pressure, and humidity

Related Website
National Geographic Okavango Wilderness Project

quality changes and potential flood warnings. To gain access to this data, a durable system with reliable technology and proven results needed to be implemented.

The objectives of the monitoring project are as follows:

1. Implement a flood warning system;
2. Monitor effects of climate change;
3. Detect harmful degradation in water quality;
4. Fill knowledge gaps on basin hydrology;
5. Inform decision making for sustainable development; and
6. Improve understanding of ecosystems.

The solution

After years of examining the changes in the wildlife communities and ecosystems along the Okavango River, a decision was made to begin monitoring areas around the Okavango Basin with an efficient system. The National Geographic Okavango Wilderness Project (NGOWP) created a hydrological monitoring plan to measure water quality, water discharge, and changes in climatic conditions. After extensive research, consulting and patience, the NGOWP configured a monitoring plan that included a variety of products from different service providers, including Campbell Scientific, to achieve its goals.

For the monitoring plan to be successful, the NGOWP needed an integrator to put the project together. After careful review, the Campbell Scientific Africa regional office was selected to participate in the project and oversee the assembly and programming of the various products to build a system that was reliable and cutting edge. Campbell Scientific Africa was chosen for several reasons.

With its CR850 datalogger, Campbell Scientific has a reputation for years of providing trusted data and accurate results. The versatility of the CR850 open platform ensured a simple way to gather, analyze, and distribute data from a variety of different sources, specifically in the inland delta environment that had proven to be a difficult area from which to gather data.

Using Campbell Scientific Africa as the integrator would enable the NGOWP access to professional and experienced technicians capable of dealing with the challenges posed by their ambitious project.

The specific products used for the monitoring system were chosen for their ability to capture data for this specific task. Water depth, surface velocity, water quality, wind, temperature, barometric pressure and humidity were all measured using various sensors. To aggregate all the products into a full system, the rugged and reliable build of the CR850 made Campbell Scientific a great fit for the job.

The NGOWP will be able to present reliable data to local governments and illustrate the dynamic nature of this unique ecosystem. Obtaining this reliable data will enable the development of policies and actions to ensure the continued delivery of ecosystem services to the people, as well as to the natural environment of the Okavango Basin. Although the solution is complex and challenging, the NGOWP is committed to providing real-time, accurate information for local governments in the Okavango Basin by using these products and partnering with Campbell Scientific Africa.

Integration

Between 2015 and 2018, NGOWP explored the full length of all the major rivers that feed into the Okavango Delta. These surveys included the collection of hydrological data, such as baseline water flow and quality, which is key to understanding ecosystem services. Gathering reliable measurements in this environment poses an array of risks and challenges. Due to the diverse sensor portfolio required for this project, Campbell Scientific Africa was tasked with fitting the many puzzle pieces together to deliver actionable results. The CR850 datalogger, in extreme environments such as the Okavango Basin area, was instrumental in achieving this.

With its years of proven reliability in South Africa, Campbell Scientific was an ideal integrator for this application. The organization's reputation in this market has been built on its ability to be trusted advisors and integrators in harsh climates. Campbell Scientific is dedicated to ensuring high-quality data, especially when that data will be used to make an impact in protecting people and ecosystems.

The outlying region of the Okavango Basin makes it difficult to service the monitoring locations on a regular basis, but thanks to the reliability and versatility of the CR850 datalogger, researchers can be confident in the quality of the data readings and communications. The low power draw and ability to communicate with other products makes the CR850 an ideal logger for this solar-powered application.

Next steps

As data continues to be gathered, new knowledge about this ecosystem is coming to light. While the depletion of natural resources can easily be seen with the human eye, reliable data is important to identify what actions should be taken to actualize conservation. Pragmatic data comes in the form of valid predictions. The CR850 datalogger captured essential environmental data for actionable insights. NGOWP will continue to gather data in partnership with Campbell Scientific for the coming years to gain greater understanding of the Okavango Basin hydrology. Thanks to the integration provided by Campbell Scientific Africa, the data collected could potentially be the key to future action that will protect this fragile ecosystem.

Since the installation of the first monitoring system at Divundu Bridge in Namibia, the NGOWP is already taking key findings to governments and other regional stakeholders. One key focus is to monitor the ecosystem services provided by the rivers that feed the Okavango Delta to secure the continued sustainable livelihoods of the people in this region. Without this, the long-term conservation of the natural environment and its wildlife will not be possible. Thanks to the partnership between Campbell Scientific and NGOWP, this is just the beginning of more remarkable discoveries.

Divundu Bridge in Namibia; the first monitoring system being installed

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