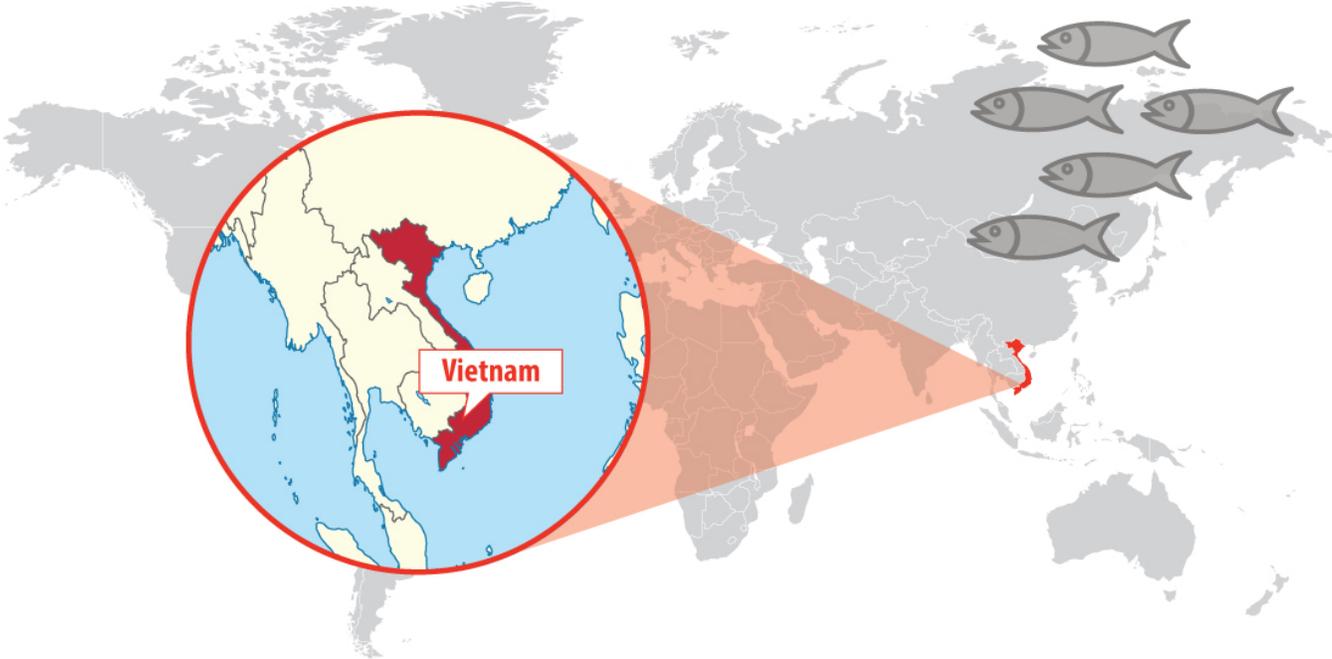


# Fish farm monitoring in Vietnam by controlling water quality in ponds and tanks

Vietnam is one of the main worldwide fish producers and exporters. Its annual fish production is approximately of 5.699.250 tons which supposes an export value of 1,7 billions USD. The main markets for its production are Europe, USA, Mexico and China. The European Union has already warned the wholesalers to establish tougher control measures on the quality of fish and also on the farming conditions.



*Thanh Binh District, Dong Thap Province, Vietnam*

PHA Distribution, one of the leading IoT & ICT distributors in Vietnam market, has deployed a wireless sensor network in a Vietnamese fish farm in Thanh Binh District, Dong Thap Province, next to Mekong river, with Libelium's Waspmote Plug & Sense! Sensor Platform. The aim of the project is to monitor in real-time different parameters to control water quality and prevent some diseases that could affect fish in order to improve the quality and quantity of the production.

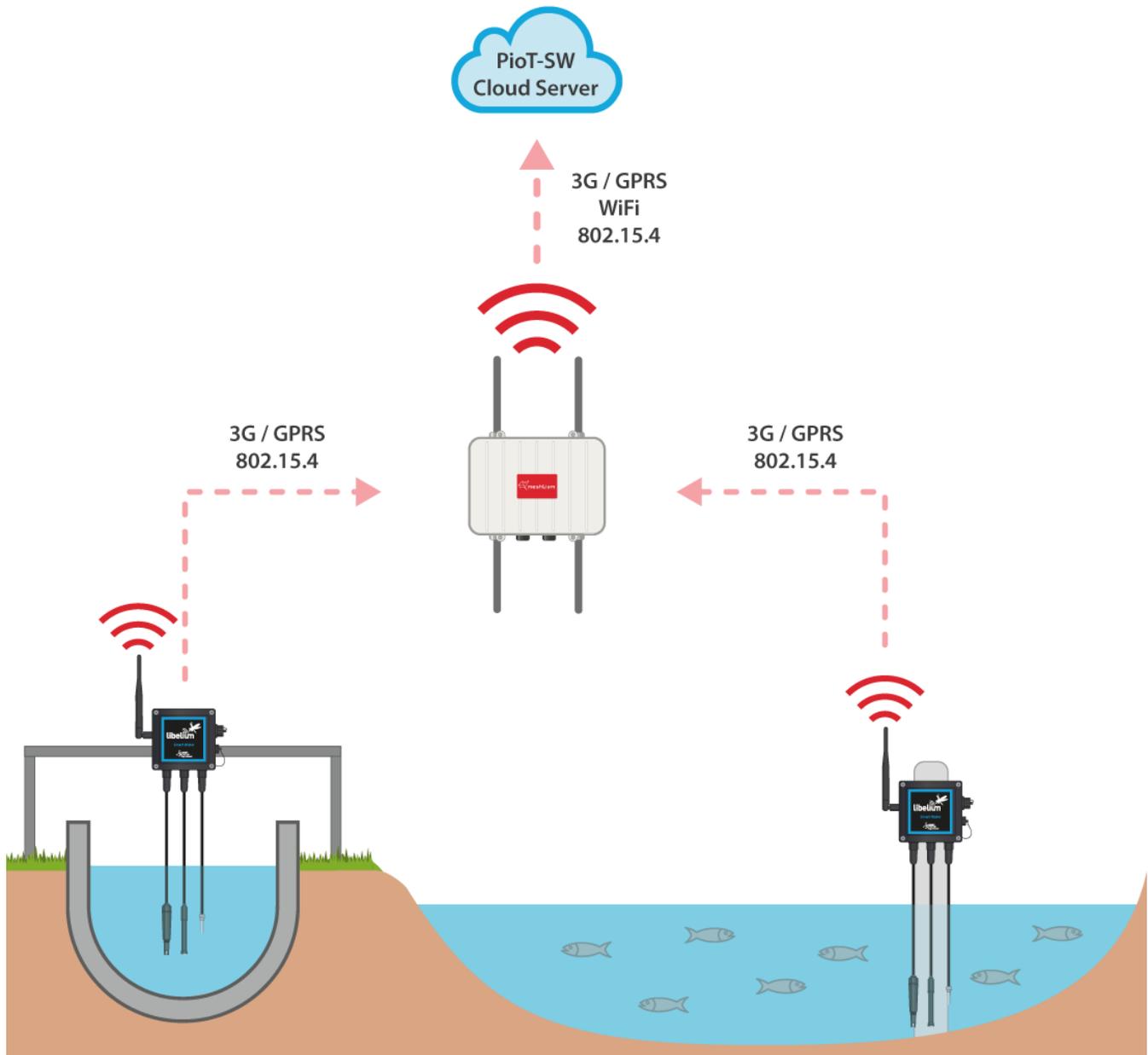


*Waspnote Plug & Sense! installation in a fish farm pond*

**Real-time monitoring to improve the production**

The main goal of the project is clear in words of Tran Vinh Phong, Managing Director at Pha Distribution: "Real-time monitoring will allow us to help our end clients to be aware of preventable diseases in order to save costs in diseases treatment and keep fish in good health before harvesting job as well as manage fish loss to the minimum rate".

The company has chosen Libelium's Waspnote Plug & Sense! Sensors Platform, fully equipped with Libelium sensors, because the hardware has a good design, it is easy to implement, scalable depending on the demands and also have low maintenance costs.



*Fish farm deployment functioning diagram*

Waspnote Plug & Sense! Smart Water have been deployed in the source of water supply and also inside the fish farm. Water and fish quality are controlled by the following parameters:

- Temperature
- Conductivity
- Dissolved Oxygen (DO)
- Oxidation-Reduction Potential (ORP)
- pH

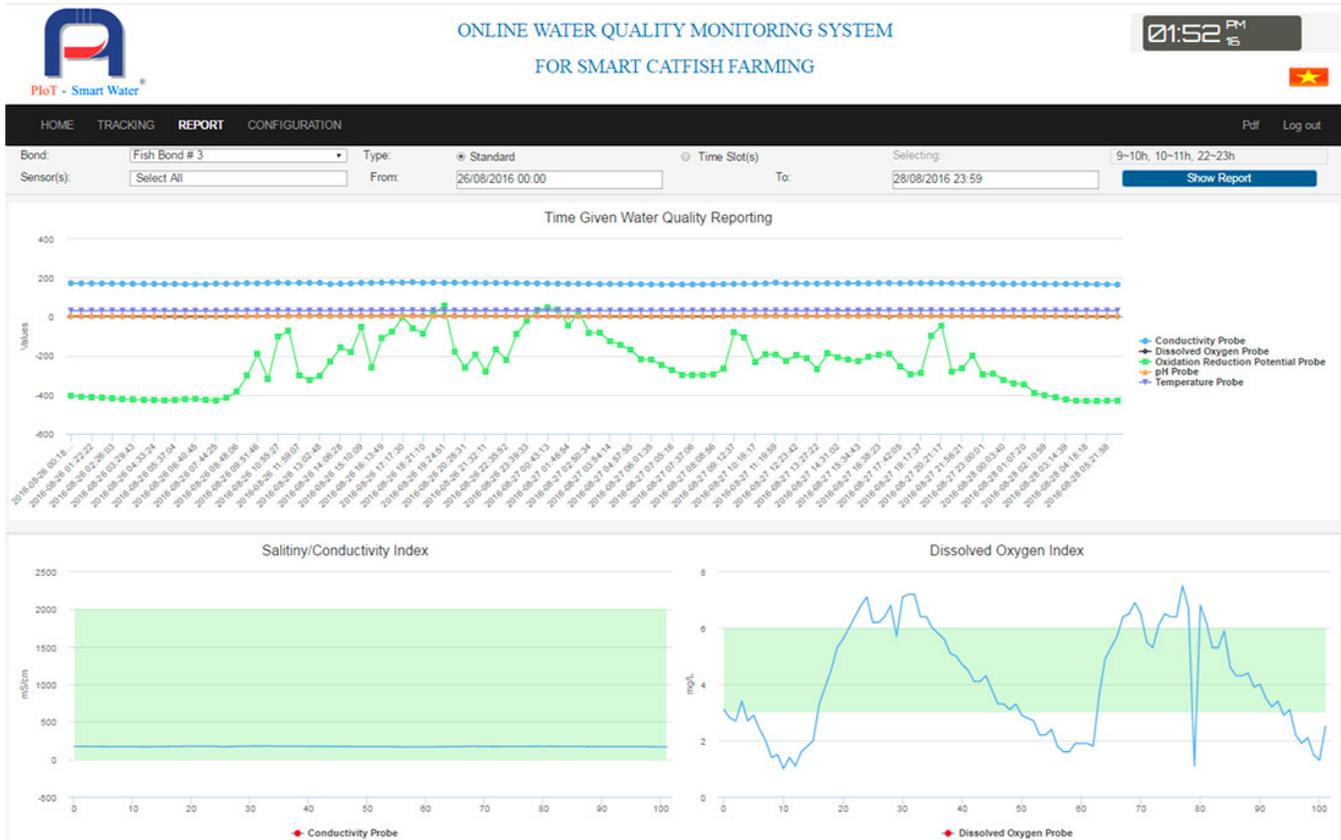
It is difficult to supply electricity to the nodes installed in the fish farm ponds, so the PHA Distribution engineering team decided to install in each node a solar panel and a battery in order to ensure a continuous energy supply.





In a second phase of the project the company is going to install Waspnote Plug & Sense! Smart Water Ions to monitor Ammonium Ion ( $\text{NH}_4$ ), Nitrate Ion ( $\text{NO}_3$ ) and Nitrite Ion ( $\text{NO}_2$ ), the main indicators of toxicity created by the own feces of fish.

Waspnote Plug & Sense! Sensors Platforms communicate with Meshlium Gateway through 3G/GPRS and 802.15.4. The information collected by the Meshlium is sent to the Cloud via 3G, 802.15.4 and WiFi. The platform used to visualize data is PioT-SW, Pha Distribution own cloud-based application. It allows to control in real-time the level of different parameters and also get diagrams showing their evolution.



Pha Distribution Application

### Less fish and money losses

In a fish farm of 5,000 m<sup>2</sup> and 4 meters deep 2,000 kilos of fish are placed in juvenile state. Six months later can be collected 30,000 kilos approximately of alive adult fish with the price of 1.50 USD per kilo. Product losses calculated are about 40% in number of animals usually due to preventable diseases that can be avoided if water quality is controlled.

Real-time monitoring at the fish farm could help to cut down the number of animals lost between 40% and 50%. That supposes collecting between 38,000 and 40,000 kilos instead of 30,000 with the same number of juvenile fish. The difference of turnover for each farm would be at least 12,000 USD every 6 months.



*Libelium sensors being installed at the Vietnamese fish farm*

"It's not only potential in fish farming but also for shrimp farming as there they need to monitor DO & pH parameters including ORP beside others to ensure their supply water quality as well as monitor shrimp's growth life-cycle successfully", considers Tran Vinh Phong.

Water quality monitoring is also essential to meet international regulations that want to assure fish quality and farming conditions. Fish farms facilities can demonstrate that companies have implemented new systems that will put them in much better commercial positions than others that are still working in a traditional way.