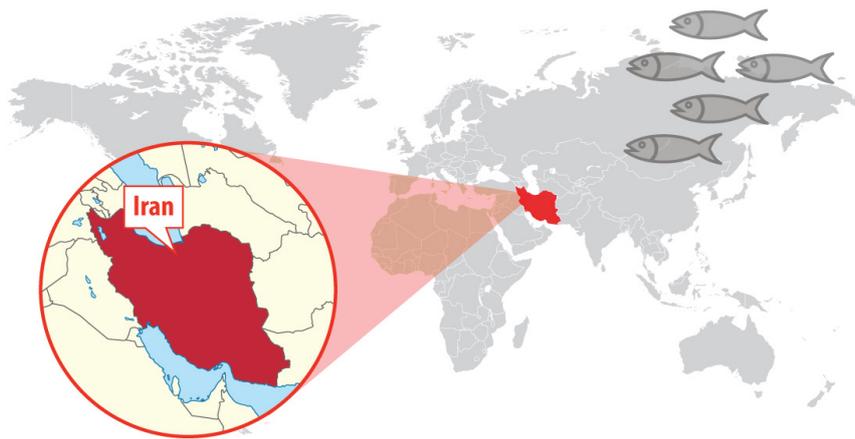


## Controlling fish farms water quality with smart sensors in Iran

The fish farming industry in Iran has rapidly grown within recent years, doubling employment rates and multiplying its production. This activity began with the enhancement of the quality of fish species selected from the Caspian Sea and then continued through the development of intensive aquaculture utilizing different foreign species. Investing in the development of earth ponds, reservoirs and sea cages has become crucial for the local government, which supports the private sector by providing low rate interest loans and suitable land at competitive prices.



*Location of Iran*

The Iranian Caspian Coast is one of the main pisciculture producing areas in the country and its territory is full of breeding pools. These **ponds are filled on average once a year** and then emptied at the end of the breeding season. This makes **water quality control extremely important for the productivity and correct functioning of the fish farms.**

[Afarinesh Samaneh Mehr Engineering Co. \(ASM\)](#), Libelium official distributor in Iran, is active in a variety of fields including smart city, smart environment, smart agriculture, smart husbandry, safety, and security, among others. The company has developed a [Smart Water sensor network](#) to **measure the water quality parameters of the fish farms in the North of the country.**



*Smart Water Sensor Network installed at fish farm in Iran*

**Water pollution is the first cause of financial losses** in the market. **The main objective of this project was to control water quality parameters in order to increase quality and productivity** as well as to reduce costs and increase profits. Having information about water quality parameters in fish breeding ponds offers the fish farmers the possibility to manage their installations in an improved and more effective way, accelerating their inner processes.

Experts list a large number of parameters that must be taken into account in order to favor aquaculture productivity. The pH and dissolved oxygen levels are some to consider. Additionally, other **chemistry limits are also recommended to protect the health of fish**, such as ammonium and nitrite, the main indicators of toxicity created by the feces of fish.



*ASM Engineering Team during the installation of the Smart Water monitoring system*

In this project, the company ASM installed four [Waspote Plug & Sense! Nodes](#) to measure water quality parameters:

1. [Waspote Plug & Sense! Smart Water](#) (2 units)
2. [Waspote Plug & Sense! Smart Water Ions](#) (2 units)

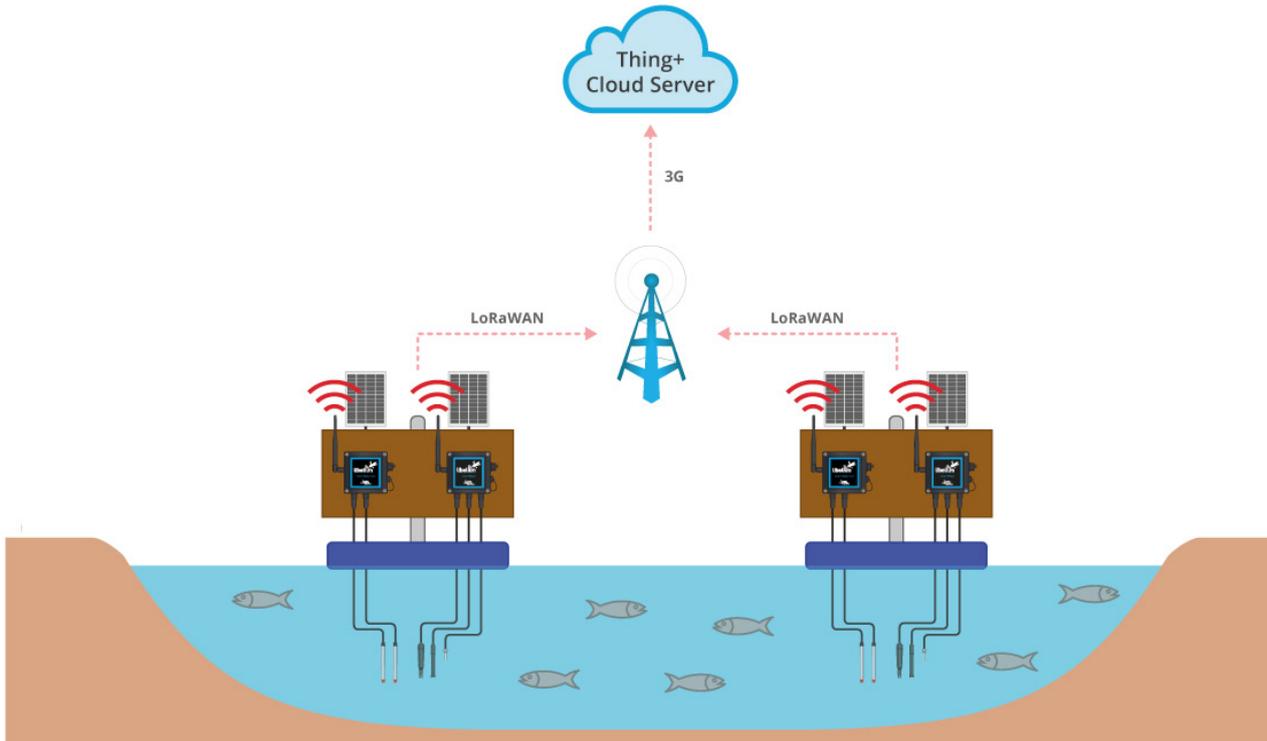
Each pair of nodes were **mounted in a buoy and located in different locations inside the breeding pond in order to cover the biggest possible area in the pool**. Taking into consideration the nature of the project with all nodes installed inside the fish farm ponds, the ASM engineering team decided to use **solar power** in order to ensure a continuous energy supply.



*Waspote Plug & Sense! Smart Water and Smart Water Ions mounted on a floating system*

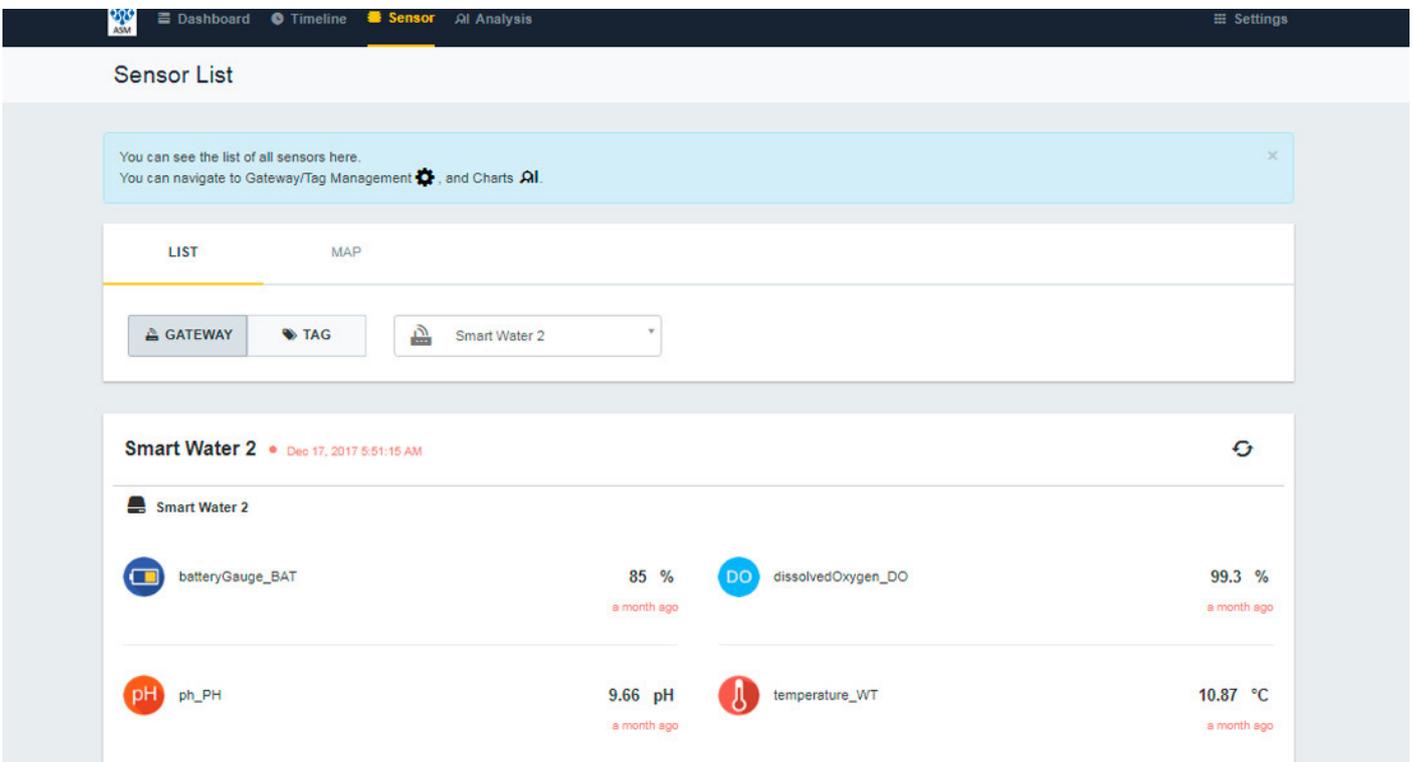
In this project, the values to control were:

- Water temperature
- Dissolved Oxygen
- pH
- Ammonium
- Nitrite



Communications diagram of ASM Smart Water project

Communication protocol between the devices and the gateway was [LoRaWAN](#) and between the gateway and the cloud platform, cellular 3G. ASM used [Loriot](#) network server for handling LoRaWAN connectivity, being the **platform** used for visualization [Thing+](#), which allows **real-time control of parameters and also obtains diagrams and tables showing sensor values.**



The screenshot shows the ASM Dashboard interface. The top navigation bar includes Dashboard, Timeline, Sensor, and Analysis. The main content area is titled "Sensor List" and displays a list of sensors for "Smart Water 2". The sensors and their values are:

Sensor Name	Value	Unit	Last Update
batteryGauge_BAT	85 %	%	a month ago
dissolvedOxygen_DO	99.3 %	%	a month ago
ph_PH	9.66	pH	a month ago
temperature_WT	10.87	°C	a month ago

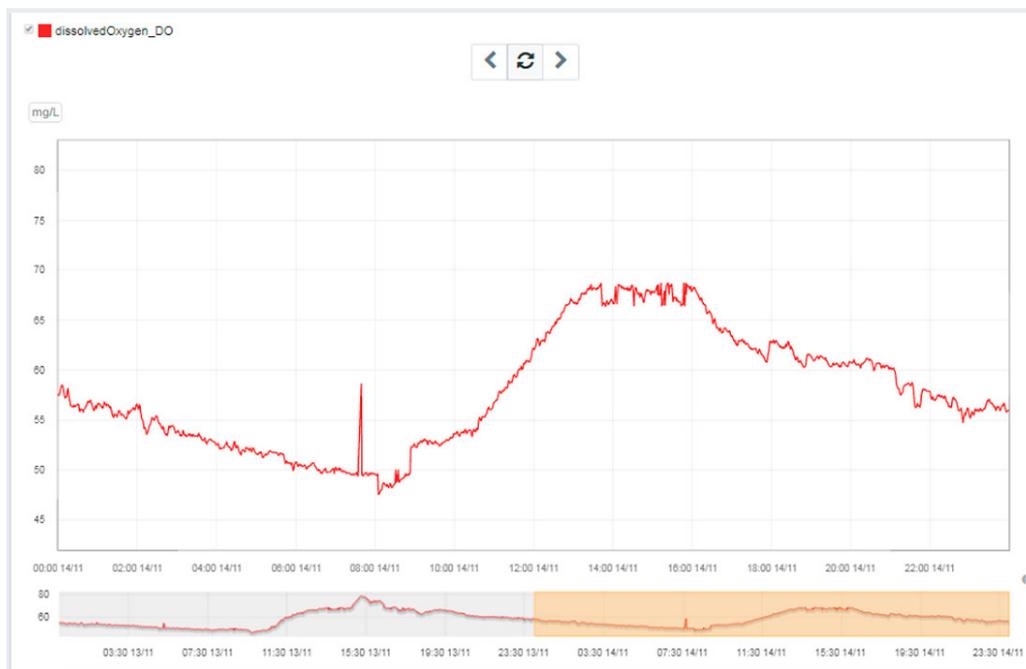
ASM Dashboard developed in Thing+ Cloud Platform

## Reduce casualties and increase productivity

The **return on investment (ROI)** of this project includes:

- Reduction of production costs
- Time savings
- Reduction of casualties
- Increase in productivity

The highest mortality rates in aquaculture are due to the quality of water, and **monitoring the water conditions can reduce by 30% to 40% of the casualties**. This is also essential to **meet international regulations** to assure fish quality and farming conditions.



*Dissolved Oxygen graphic obtained from ASM Dashboard*

Thanks to this system, fish farm facilities can demonstrate that **implementing their monitoring methods and automating their activities will put them in a much better market positioning** than others that are still working in a traditional way.

ASM highlights that Libelium's sensor platform offers the following key factors:

- Low power, versatile and semi-autonomous devices.
- Wide range of sensors and measurement probes.
- Ability to support standard radio and (secure) communication protocols.
- Ease of integration with cloud based solutions.
- Reliability and durability of the IoT platforms and sensors.
- Accessibility to embedded software platform (open source or otherwise).
- Affordability of the nodes.
- Simple and easy installation and deployment of the nodes on site.

The ASM Engineering Team was completely satisfied after the installation of the system. **"We succeeded in completing this project with Libelium products and we are fully satisfied with this equipment"**, comments Ali Bordbar, Marketing & Business Development Manager at Afarinesh Samaneh Mehr Engineering Co.

If you want to download the article in Spanish, please [click here](#).

For more information about our products, contact the [Libelium Sales Department](#).

#### More info:

- For technical details on Waspote Plug & Sense! Smart Water: [Waspote Plug & Sense! Smart Water Technical Guide](#).
- For technical details on Waspote Plug & Sense! Smart Water Ions: [Waspote Plug & Sense! Smart Water Ions Technical Guide](#).
- Read more about Libelium sensor product lines in the [Waspote](#), [Waspote Plug & Sense! Sensor Platform](#) and [Meshium Gateway](#) websites.

#### References:

- Afarinesh Samaneh Mehr Engineering Co. (ASM): [asm-co.ir](#)
- Lorient: [loriot.io](#)
- Thing+ Cloud Platform: [thingplus.net](#)
- Food and Agriculture Organization of the United Nations (FAO): [fao.org](#)
- Smart Water sensors to monitor water quality in rivers, lakes and sea: [libelium.com](#)

Discover our [Smart Water Kits](#) at [The IoT Marketplace](#).

More case studies at: <http://www.libelium.com/resources/case-studies>