Water Research to Market (*)

Innovations in the field of aquatic ecosystems follow up and upgrading for reaching water Good Status

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Abstract:
The European project Water Research to Market, funded under LIFE program, aims to develop a strategy to accelerate the transfer of research results in the field of water to practitioners (end-users). From the identification of 200 research results in the field of water at the European and national level (France, Poland, Romania, Spain), the project has developed a promotional strategy by evaluating some results in terms of distance to the market, in terms of their spread via e-fair (fair innovations) and in terms of events. In this article, Water RtoM illustrates its strategy with 5 innovations in the field of aquatic ecosystems.

Keywords: innovation, aquatic ecosystems, technology transfer, rivers restoration, rivers monitoring, evaluation strategy.

Introduction

The implementation of the European water directives (such as the Water Framework Directive and its daughter directives) will help to achieve good water status for more than 60% of water bodies in Europe by 2015. To achieve this and maybe make more, it will be necessary to use new technologies and new knowledge to reach objectives of the guidelines. Many research results exist but their transfer time is of the order of a decade. Water RtoM is testing a strategy for promoting the results of research to accelerate the transfer of innovative results to practitioners (specifically basin organizations, planners, municipalities, water utilities and other users ...) and to their suppliers (technology, consultants, operators).

Method

The strategy developed by Water RtoM relies on eve of research results in the field of water at the European level (through projects financed by LIFE, INTERREG ...) and at national level (France, Poland, Romania, Spain). From the identification of 200 research projects, Water RtoM has pre-selected projects that seem closer to the market. Further evaluation of the most promising innovations (tools, methods, treatments) has permitted to estimate their potential for use by an end-user, at a reasonable cost, with acceptable risks. This analysis tool developed in the project is Remas (Research to Market Assessment Strategy). When information is available, the evaluation includes the intellectual and industrial property. For innovations classified as "ready to be implemented" or, in other words, not far from the commercialization phase, a deeper analysis is performed in close collaboration with research teams to identify the steps and build a "road map "(called business case).

Water RtoM wants also to promote innovations "near market" to potential users (water managers, consultants, developers of innovations,...), by a “promotional plan” based on e-fair innovations (e-fair) (available on the website www.waterrtom.eu, in English), on professional meetings, on seminars or on virtual meetings (e-seminars).

A guide for end-users is in preparation (available May 2013). From the developed strategy and developed tools, Water RtoM will propose recommendations on the basis of the experience of two years of development of the project to bring users and researchers together.

Results
The "e-fair" database actually include more than sixty innovations on various topics in the field of water. Some are related to **aquatic ecosystems**.
In the following paragraphs are presented five innovative projects selected from eleven identified.

Project N° 1 - Innovation: “Wired trees”.

Fallen trees in the river are fixed with cables and emerged parts cutted to minimize jams. These trees are located in or near pits along the shore. They bring to the fish fauna area caches, food and support to some species for reproduction. For some fish, it is a nesting support. This project is funded by Agence de l'Eau Loire Bretagne, Conseil Général du Poitou and Syndicat mixte du Clain Sud.

The works have been conducted by the “Syndicat mixte du Clain Sud” with the participation of the « Fédération départementale de la Pêche de la Vienne » and ONEMA.

Innovative aspects: This is a simple technology at low cost. Ecological diversity will upgrade with this method. This methodology/technique will solve problems of lack of ecological diversity in plain rivers. It will help to avoid removal of fallen trees from rivers. Fallen or cutted trees will fill river pits.

State of development: Many wired trees (more than 40) have been fixed in the Clain Sud watershed since 2007. Technology is under control. Application on other watershed’s types must be tested.

Distance to market: This technology can be implemented in many regions of european countries with similar problems (lack of habitat diversity). Modification in the river dynamic must be checked. For that, no more than 1/3 of the river must be occupied by trees.

Risks: Investment in time (for technology installation). Technology limited to low diversity and plain rivers for the moment. Trees used must be hardwood and pemanently covered by water.

Next steps: User's guide writing will need time and work, but Clain watershed river engineer is available to do it. He is also available for dissemination, communication,... Clain engineer will update local website before the end of the year to address new targets: everyone knowing few or nothing on the subject and specialists.

Project N° 2 - Innovation : “Hydro-mimicry”.

This dynamic approach will support hydroelectric units managers to actively participate in solids transport managing while using sediments from hydroelectric

units. It will allow streams local managers make infrastructures less invasive with sustainable and positive impacts on the functioning of streams dynamic evolution while controlling costs. This methodology will limit heavy works. Team in charge of works is ready but funding have not been defined yet (in discussions).

Innovative aspects: The methodology is using many ways and many tools (measurement of particles size, measurement of flow, measurement of solids, remote sensing,...). This methodology is completely in phase with the Water Framework Directive. This methodology will help to solve problems before and after dams. The methodology takes into account hydroelectric production, dynamic management of streams and relations with users.

State of development: Actually, this methodology is applied on a pyrenean river (Gave de Pau) with turbulent flow and hydroelectric equipments across them. Methodology is empiric and very novative.

Distance to market: This methodology can be used across Europe on streams in front of ecological continuity problems, especially in the beginning of watersheds and on mobile-bed rivers and/or gravel rivers.

Risks: Investments will be necessary for this methodology use: equipments for river surveys, for flow measurements,... The project team is in search of scientific backing... Methodology is not suitable for lowland rivers.

Next steps: More measurements, more data collection, more in situ methods testing and remote sensing are necessary on pilot river and more investments on equipments.

Project N° 3 – Innovation: Fallopia genus invasion

Rivers banks across France and other european countries are invaded by fallopia species (renouée du Japon). The project aims to seek effective ways of restoring endemic plant communities affected by this invasion in searching competing species resistant to allelopathic compounds generated by fallopia species. Also, the project works on species with chemical weapons against fallopia species. This project has been funded by FEDER Program, Agence de l'eau Loire Bretagne, Agence de l'eau Rhône Méditerranée Corse, Conseil général de la Loire, Région Rhône-Alpes and CNRS. The works have been conducted by Université de Lyon and CNRS.

Innovative aspects: Fallopia genus is everywehere. Many methods have been tried and no one succeeds. The interest of the actual research is to develop biological weapons against this invasive plant.

State of development: Research begins in 2008. Publications on the subject from 2008 to 2012. Methodology is now available. A user's guide has been produced.

Distance to market: This methodology will be useful across european countries confronted to this problem. The user’s guide diffusion must be done.

Risks: Few risks except investments on works for implementation of suitable species. Some risks with species hated by the people like sambucus ebulus with efficiency against fallopia.

Next steps: Dissemination of user's guide through rivers networks.

Project N° 4 – Innovation: Settler filter for drinking trough

Drinking troughs are used to avoid cows trampling on the bank. Drinking troughs are feeded by gravity water (rivers, creeks,...) full in colloids and suspended solids. Settlers filters has been designed and experimented to. This project has been funded by Agence de l'Eau Loire Bretagne and Région Limousin. The works have been conducted by Syndicat mixte Monts et Barrages and CEN Limousin.

State of development: Filters have been installed in situ since april 2012. Tests done on filters seem successful. A patent application has been filled. 15 filters will have been installed at the end of the year (2013).

Distance to market: To reach a "ready to use" level, commercial agreement with drinking trough sellers and agreement with authorities must be defined.

Risks: The technology has not been tested in rivers with heavy loads in suspended solids. These filters include a fine grid (1 mm in diameter) coupled to a settler.

Innovative aspects: It is a simple device for a large application. This device will help to protect surface water at low cost for farmers. Users will have to obtain or buy licences, buy equipments and install it.

Next steps: Owners have to make completion and submission of the patent application and user's notice writing. Diffusion must be done for associations (free) and sellers (paying) of this type of device.

Project N° 5 – Innovation: AMPERES

This project dealt with emerging contaminants analysis (pharmaceuticals, etc.) and wastewater treatment performance for these substances. The project has helped to develop performing sampling methods (Polar Organic Chemical Integrative Samplers - POCIS) and analytical methodologies for these micro-pollutants in complex matrices. This project has dealt with chemical pollutants from Water Framework Directive and "new pollutants". This project has been funded by ANR. The works have been conducted by IRSTEA, université de Bordeaux, Suez-Environnement and Agence de l'eau Rhône Méditerranée et Corse.

Innovative aspects: Detecting new pollutants for performances checking of wastewater treatment plants and surveying of water quality.

State of development: The project is finished and obtained Pierre Potier Prize awarded by the French Federation for Chemical Sciences, UIC and the Ministry of Industry.

Distance to market: Methodolology seems to be defined. Methodology diffusion has been done by scientific articles and 2 thesis.

Risks: Investments will be surely necessary for equipments (new laboratories) and training.

Next steps: Job has been done on molecules from "old regulation". In the near future, works will be on new molecules in other projects.

Other projects, selected in the first step, but not evaluated by Water RtoM:

-BIOALERT: Love wave immunosensor highly sensitive for rapid detection of microorganisms in water for a warning device (ENSEIRB project, ANR Funding).

-Bioengineering and climatic changes: Recovery capabilities evolution of shoots in a changing climate: the case of willows used in bioengineering (Project by Unité Ecosystèmes Montagnards, Equipe Environnement Ville Société, Laboratoire d'Ecologie des Hydrosystèmes Fluviaux , Association Rivière Rhône Alpe on CNRS Funding).

-BIOMARQU'INDIC: Biomarkers and bioindicators complementarity to assess rivers ecological status (Project by IRSTEA, EPOC, UPSUD-Paris11, URCA-Reims, VigiCell on Agence de l'eau Seine Normandie Funding).

-Gabion fishway: Gabion fishways necessary for ecological continuity especially for trouts and salmons (Project by Syndicat mixte Monts et Barrages, EPTB Vienne et PNR de Millevaches and Funded by Programme Européen FEDER, Agence de l'eau Loire Bretagne, Région Limousin).

-IMECO : Use of images of earth observation (high definition) to identify and characterize restored ecosystems restored on the channeled Rhone (Project by Unité de Recherche Ecosystèmes Montagnards (EMGR) CEMAGREF de Grenoble, CNR on CNRS Funding).

-INGEZHA: Ecological engineering of Artificial Wetlands to limit transfers of pollutants of agricultural origin (Project by Cemagref UR HBAN, UMR Sisyphe, UMR Bioemco, UMR INRA-Agrocampus-Rennes EQHC on CNRS Funding).

Few References

Water RtoM : http://waterrtom.eu
LIFE+: http://ec.europa.eu/environment/life/project/Projects/index.cfm
ONEMA database
ANR: http://www.agence-nationale-recherche.fr/
Informations from journals and scientific events (ES, PL mainly)
National Authority for Scientific Research in Romania

http://www.ancs.ro/en/articol/980/despre-ancs-prezentare