Alessandro Balbo and Giacomo Galimberti present: Citizen hydrology for data management and people engagement at basin scale in river contracts

CITizen HYDrology (CITHYD) experience

Venice



Summary

- Why CITHYD?
- Inspiring existing experiences
- What is CITHYD
- Strenghts of CITHYD
- Possible critical aspects
- Next steps



Why CITHYD? The EU and Italian laws

• The EU Water Framework Directive 2000/60/EC and EU Floods Directive 2007/60/EC encourage the effective public participation in order to increase public awareness of environmental issues and support for the decisions taken.

• Water Framework Directive has been transposed in Italy by Legislative Decree 152/2006, which, from February 2016, inserted the river contracts, as voluntary tools for strategic and negotiated programming at a basin and sub-basin scale.

• **River contracts**, through public participation, pursue different aims (the protection and proper management of water resources, the enhancement of river territories, the safeguard from the hydraulic risk, and local development)



Why CITHYD? With CITHYD we want to:



• Create an experience of citizen science to improve the link between people and rivers through the measure of river water levels matching river contracts goals.

• Create a tool for storage of water level data, from citizen measures, completely free downloadable and usable by anyone, now and in the future, that could be improved to receive data also from other sources (electronic hydrometric sensors, etc...)

• Improve the knowledge on low and high flows, also on small rivers, generally poorly monitored but often extremely critical for flood risk and DMV.



Inspiring existing experiences



CITHYD is obviously not the first experience of non profit citizen science in hydrology in the world. There are interesting experiences with different grade of complexity, as:

- Crowd Hydrology (<u>www.crowdhydrology.org</u>)
- Community Collaborative Rain, Hail and Snow Network (www.cocorahs.org)
- Cooperative rainfall monitoring network for Arizona: Rainlog (www.rainlog.org)
- WeSenselt (<u>www.wesenseit.eu</u>) And many others.....

Cithyd wants to collect the largest possible number of water level measures, creating new stable measurement stations in the most simple and inexpensive way.

What is CITHYD: the idea and the goals

CITHYD is an application that receives water level data, collected and sent by citizens with smartphone or tablet, in river cross sections instrumented with a staff gauge, stores the data, publishes and creates reports and graphics available for free to everyone.

Goal	Description	Answer	
Simplicity	Easy data collection and sending, user friendly interface, design clearness	Use of Smartphones, QR code, few fields to fill	
Engagement	Crowdsourcing, awareness, community making	Dedicated website about the project and the river environment, infographics, bi-directional communication	
Cost	Low or no costs for citizens and institutions	Flat telephone rates for sending data, freeware software, inexpensive field tools, possibility to use existing level gauges	
Time	Quasi-Real time, short citizen's time need, no need of formal training	Easy measurement process, fast publication of data	
Hydrologic data	Relevant aperiodic data for hydrologic analysis in small basins	Choice of variable useful for predictions in ungauged basins (PUB) and calibration of hydrological models	
Reliability	Good measurement accuracy	Good ability to measure water level	

What is CITHYD: the conceptual scheme (1)

Near a staff gauge CITHYD (3) located on a river basin (1) the user will find an information panel containing a unique QR code (2). Pointing on QR code the camera of smartphone or tablet (4) and via web (5) he will be connected to CITHYD website (6), with a user-friendly mask referred to that staff gauge, in which he can insert the water level just read. The data will be stored in a geodatabase, published in real time on a map and the data, inserted by all users, can be read and downloaded, as text files, tables and graphics (7), for free by anyone.

The data are issued according to the Italian Open Data License version 2.0

What is CITHYD: the conceptual scheme (2)

Institutions and associations, through conferences and social networks can contribute to the diffusion of the project and increase the number of citizens involved. The data can be used for scientific research, for planning and design and also as a support for the management of emergency situations in case of floods.

What is CITHYD: the components

Staff gauges

Every kind of staff gauge (new or existing) can become a CITHYD staff gauge

A staff gauge enters in CITHYD network simply initializing the staff gauge, on CITHYD platform, assigning a unique QR code, and installing an instruction panel with QR code near the staff gauge.

The instruction panel

The instruction panel describes CITHYD experience, and gives simple instructions to take a good measure

What is CITHYD: the components

The QR code and the data entry mask:

QR code

The data entry mask, will open automatically by pointing the camera of smartphone or tablet on QR code.

The data entry mask will ask the user to insert the water level he is reading on the staff gauge, using the scrollbar.

The staff gauge is initialized inserting the max and the min level readable on the staff gauge, so in the scrollbar you can not find values over that limits. Thanks to the scrollbar and the limits the occurrence of typographical errors is minimized.

What is CITHYD: the components

The website:

Citizen's measure becoming from CITHYD staff gauges are stored in a DB and visible by all users realtime. Every staff gauge is georeferenced on a map in the home page of the website and has a register of the measures (text and graphic) with the characteristic data of the station. The register of the measures can be downloaded for free.

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Strenghts of CITHYD

SIMPLICITY: Everyone with a smartphone can take a water level in two minutes following few and simple passages

ENGAGEMENT: Citizens can help institutions and researchers by sending data easily, improving their knowledge about rivers, hydrology and hydraulic risk. The tool can be used to improve community resilience.

INCREASE OF RIVER DATA: Is not a substitute of electronic hydrometric sensors but an integration (also in the same place, in order to create engagement). Data collected during special occasions, for example floods, by trained users can be used immediately for emergency management.

You can quickly and simply activate also temporary stations to collect data related to a specific use or project.

COST: staff gauges and signs are not expensive, especially if already provided in current projects. The use of the app and of the data are free and open under Italian Open Data License v. 2.0.

The low cost allows the activation of a great number of measurement stations, on condition of being able to involve local communities.

Possible critical aspects (1)

RELIABILITY OF DATA: depends on citizens reliability and the actual checks provided are only concerning the boundary limits and the captcha

CITHYD ANSWER:

Assignment of one or more voluntary keeper of the staff gauge Engagement involving local association and public administrations Creation of a community of registered users interested in the good quality of data Correct location of the staff gauge to have a big number of data and isolate wrong data

Other authors shows good agreements between citizen data and electronic measurements (C. S. Lowry and M. N. Fienen 2012)

DURABILITY OF THE STAFF GAUGE

CITHYD ANSWER: Installation handbook and technical specifications Keeper of the staff gauge Engagement involving local association and public administrations

Possible critical aspects (2)

CREATION OF A CITIZEN COMMUNITY: many citizens contribute to the experience much more you can collect data

CITHYD ANSWER:

Creating engagement through local association and public administrations and insertion of CITHYD in river contracts projects or projects involving people Careful choice of the installation point (in order to involve citizens and make maintenance easy)

Next steps

 Actually CITHYD is in the test phase and will be ready in official version on September 2016

 Is in definition phase the application of CITHYD in some river contracts projects and other projects concerning river and resilience

Other steps provided for next year:

- Start of training and education projects in collaboration with Institutions
- Improvement of CITHYD with Validation of level data and photo storage

Thank you for your attention

You will find CITHYD soon at www.cithyd.com

Contacts: info@cithyd.com

