

Fostering Environmental Awareness Through Innovation: Outcomes from the I-CHANGE Project

Antonio Parodi (CIMA) and the I-CHANGE team





Main objectives

Raise awareness of natural hazards and of the impacts of climate change



through **direct collection** of environmental data



with **new and user-friendly tools**(sensors, monitoring devices, simplified models and apps)



to enable adaptation and mitigation through behavioural change

 I-CHANGE: Individual Change of HAbits Needed for Green European transition

Duration: 42 Months (2021 – 2025)

EU contribution: about 5 mil euro

Coordination team:

- Antonio Parodi (CIMA, Project Coordinator)
- Silvana Di Sabatino (UNIBO, Scientific Coordinator)



Who









16 Organizations

















12 Countries











Foundation Elements of the I-CHANGE Project

What were the gaps in literature

- Role of citizen science and co-creation of observational initiatives in motivating the shift to sustainable behaviors and climate action poorly addressed
- Data collected in citizen science monitoring activities often not publicly available and properly documented in terms of data quality
- Gaps in qualitative and quantitative methods to assess the effectiveness of behavioral and consumption towards mitigation and adaptation to climate change

What did we achieve in the project

- Documented role of citizen science and monitoring activities in the I-CHANGE LLs in the observations of climate change and environmental impacts of personal lifestyle options
- Promotion of good practices in sharing data and data quality checks via the dashboard
- Validated novel qualitative and quantitative methods to assess the effectiveness of behavioral and consumption patterns in mitigating and adapting to climate change



Foundation Elements of the I-CHANGE Project

Environmental and climate challenges addressed from two perspectives:

 Empowerment through knowledge acquired through handson participation in the monitoring and assessment





Understanding the role and the impact of individual choices (behaviour, lifestyle and consumptions) in the daily life and its consequences on the environment



The Three Pillars of I-CHANGE

Science

- Climate change awareness and education
- Validated methodologies to observe the environment and environmental impacts of individual behaviors

Technology

- Improvement of data usability and interoperability
- Set of low-cost sensors and dedicated tools for observation and assessment of impacts of personal behaviors

Citizen Engagement

- Active participation of citizens
- Active observation of the environment and of the communities within the environment

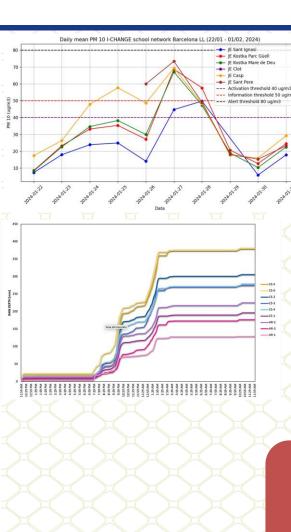


8 Living Labs





Citizen science in the LLs: The process



Volunteer recruitment and Citizen engagement

Data collection and documentation

Data from official sources + scientific knowledge

Data understanding, analysis and reflection from LLs participants

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NTERACTIVE WORKSOPS

Increase individual awareness and knowledge in climate change issues in the LL environment

SENSORS

APPS

SURVEYS

Convey a dialogue with local LL stakeholders on mitigation solutions

Reflect about our roles in climate change impacts and how we can contribute to mitigate them or adapt to new realities



Citizen science in the LLs: key figures

Over 6400 participants engaged through the 8 project Living Labs

_	ntations of 43 codesigned science campaigns
46%	Short term (=< 3 days)
26%	Mid term (=< 1 month)
28%	Long term (> 1month)

For those implementations, 289 low cost sensors where deployed

26%	Indoor thermometers
32%	Compact and mobile meteorological stations (MeteoTracker, MT)
19%	Low cost air pollution stations (Smart Citizen Kits, SCK)
14%	Meteorological stations
9%	Other sensors



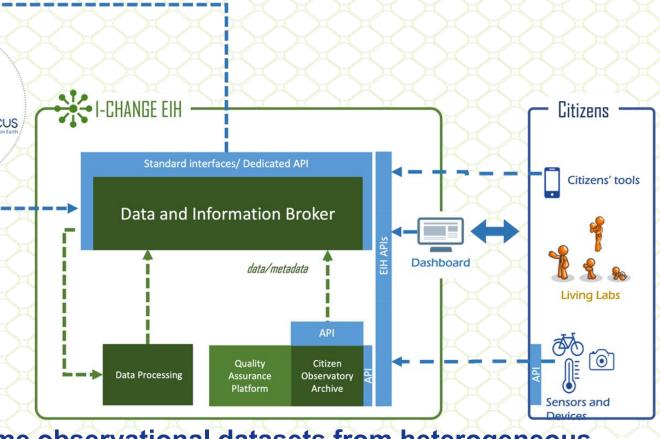
Main achievements:

EIH and real-time citizen science data

o The Environmental Impact Hub (EIH) is a data infrastructure developed within the framework of I-CHANGE to enable easy, user-friendly access to the project's data and analysis

Platform, and the Dashboard;

The EIH integrates different components, namely the Data and Information Broker, the Citizen Observatory Archive, the Quality Assurance Platform, the Processing



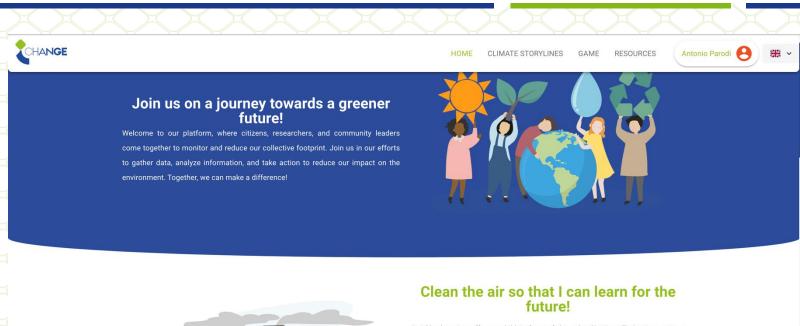
 EIH, as a participatory platform, collecting real-time observational datasets from heterogeneous sources as personal weather stations (e.g. Acronet), meteorological sensors that can be attached to motorised vehicles and bicycles (e.g. MeteoTrackers), air quality sensors (e.g. SmartCitizenKit) amongst others, as well as manually collected observations datasets.



Main achievements: I-CHANGE dashboard

Main use cases:

- Acknowledge oneself with hazards through interactive informative pages (home page, Climate Storylines);
- Engage citizens in science with the crowdsourcing tool (Climate Campaigns);
- Empower citizens by technically supporting them in understanding and contextualizing collected sensor data through the project;
- Trigger behavioural changes step by step through the avoided carbon footprint app and the I-CHANGE Game.



Quickly dropping off your child in front of the school? *Air pollution* is a serious issue around schools and their yards during morning rush hours and when school ends. Especially, during cold winter mornings when the air is basically not moving, and the car emissions are accumulating. *Polluted air can cause learning and concentration issues* to the children or worsen chronical illnesses such as asthma. Learn more about air pollution in your area, how it is linked to weather conditions, and most importantly, *how we can reduce the pollution* in front of schools for a brighter future of our children.

ALL ABOUT AIR POLLUTION

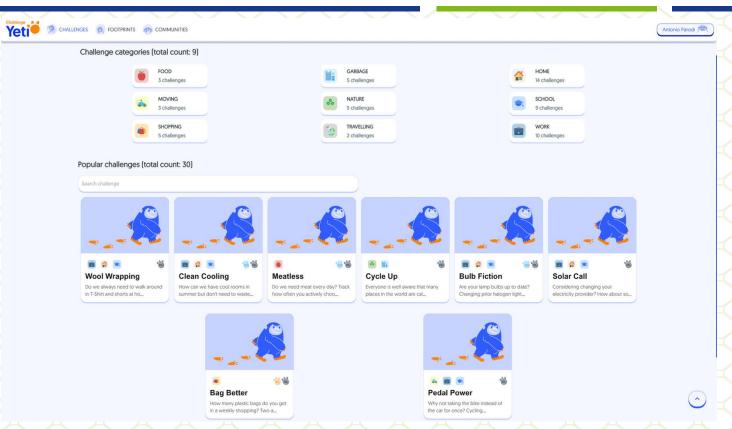
https://citizens4climate.com/



Main achievements: YETI app

- Beyond Carbon Calculators:
 - ChallengeYeti is not just another app for measuring carbon footprints, it rather inspires us to take tangible steps towards an eco-friendly lifestyle;
- Incremental Changes:

 It encourages us to adopt small,
 manageable actions that collectively lead to significant environmental benefits;
- Community Engagement:
 ChallengeYeti stirs us to involve friends, family, colleagues, and others to join the movement and act together, creating a supportive and motivating environment;



https://challengeyeti.com/

Knowledge Sharing:

 app allows users to both discover and contribute new actions, making everyone an active part in the journey towards sustainability.



Main achievements: Citizen science campaigns

The citizen science campaigns in place for observing and monitoring meteo-hydrological risks from extreme weather events can be summarized as:

- Meteotrackers campaigns: in high schools projects (BALL, GELL, DULL, HALL), cycling campaigns (AMLL, BALL, BOLL, GELL), walking activities (BALL, GELL, JELL) and in a daily data collection campaigns in boats and city buses (GELL)
- Apps: FLOODUP and other apps to collect information form extreme weather events, floods and landslides (BALL, GELL, OULL) and a crowd-sourcing app trough the dashboard to collect indoor temperature and citizens' perceptions and feelings during heatwave events
- Other citizen science experiments: workshops on early warning actions for severe hydrometeorological events (GELL)







Main achievements:

Climate Actions Training Schools

Presentations, discussions, interactive games, interactive demonstration, showcase of sensors, walk and demonstration, and participatory mapping













Main achievements: Scientific publications

- 26 accepted peer-reviewed publications
- 2 publications under review/in preparation



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and Earth System (EGU

The role of citizen science in assessing the spatiotemporal pattern of rainfall events in urban areas: a case study in the city of Genoa, Italy

Nicola Loglisci¹, Giorgio Boni², Arianna Cauteruccio², Francesco Faccini^{3,4}, Massimo Milelli¹, Guido Paliaga⁵, and

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Adstruct. Clinitac extange in the original region is manifesting itself as an increase in average air temperature and a change in the rainfall regime; the value of cumulative annual rainfall generally appears to be constant, but the intensity of annual rainfall maxima, between 1 and 24 h, is inreasing, especially in the period between late summer and early autumn. The associated eround effects in urban arcarry autumnt. He associated ground effects in urban ar-eas consist of flash floods and pluvial floods, often in very small areas, depending on the physical-geographical layout of the region. In the context of global warming, it is therefore important to have an adequate monitoring network for rain vents that are highly concentrated in space and time. This reearch analyses the meteo-hydrological features of the 27 and 28 August 2023 event that occurred in the city of Genoa, ltaly, just 4d after the record maximum air temperature was recorded: between 19:00 and 02:00 UTC almost 400 mm of ainfall was recorded in the eastern sector of the historic centre of Genoa, with significant ground effects such as flooding episodes and the overflowing of pressurised culverts. Rain-fall observations and estimates were made using both official or "authoritative" networks (rain gauges and meteorological radar) and rain gauge networks inspired by citizen science principles. The combined analysis of observations from authoritative and citizen science networks reveals, for the event analysed, a spatial variability of the precipitation field at an hourly and a sub-hourly timescale that cannot be captured by the current spatial density of the authoritative measurement tations (which have one of the highest densities in Italy),

Abstract. Climate change in the Mediterranean region is Monthly total rainfall and short-duration annual maximum the most important aspects in terms of flood prevention and protection in urban areas. The integration between authori-tative and citizen science networks can prove to be a valid contribution to the monitoring of extreme events.

precipitation phenomena at the global scale is an importan field of research aiming at assessing possible changes in fre et al., 2022; Sauter et al., 2023). Based on observational data Seneviratne et al. (2012) and Raymond et al. (2020) concluded that it is likely that the number of heavy-precipitation events over land had increased in more regions than it had decreased, though there are wide regional and seasonal varia-

Du et al. (2019) and Dunn et al. (2020) showed that the

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Going to the Zoo: A comparison of travel time ratios in 21 European cities

Anna Mölter 1, Nadia Giuffrida 1, Francesco Pilla

A good public transport system is an essential component of susport has multiple benefits, which go beyond providing transportation for issions as well as road traffic accidents: it strengthens

the local economy; it promotes healthy lifestyles; it provides equal opthe local economy; it promotes healthy lifestyles; it provides equal op-portunities to disadvantanged groups (Voelmant et al., 2020). UN Habitat, 2021). The United Nations' Sustainable Development Gools (SDG) acknowledge access to adequate public transport as a basic need in unban settings (UN Habitat, 2021). The aim of SDG target 11.2 is for all citizens to be able to use selse, directable, accessible and sustainable transport systems by 2030, which should be achieved through the

transport, which in turn will improve the health and well-being of El

Received 26 February 2024: Received in revised form 11 June 2024: Accepted 27 June 2024



Main achievements: Photo book

The digital camera emerged as significant instrument for fostering citizen participation; photography has resulted as a vital communication tool to engage the public and encourage active involvement in matters related to climate change, sustainable development, and environmental conservation. With a digital camera, an amateur photographer can transform into a citizen scientist, while photography contests and related activities stimulate interest and enhance public consciousness regarding climate change.

691 **●** VIEWS 863

▶ Show more details







EU-level Learnings How to Improve European Citizens' Behavioral Shift Towards Sustainable Lifestyles

Insights from the I-CHANGE Project

Selene Tondini **Teresa Carlone** Maurizio Bergamaschi Silvana Di Sabatino

Alma Mater Studiorum, University of Bologna -Department of Physics and Astronomy



Take-Home Messages

Strategic stakeholder management, encompassing analysis, engagement, and the cultivation of longterm relationships, is essential for fostering collective climate action. Engaging a diverse array of actors ensures that climate solutions are co-developed, contextually relevant, and widely supported

Living Labs serve as locally embedded platforms for collaborative climate innovation. By translating citizen science into actionable change, these spaces empower communities to co-create practical solutions and serve as testbeds for behavioral and technological interventions.

The co-creation and dissemination of knowledge are vital to promoting scalable, sustainable lifestyles across Europe. Through inclusive, bottomup approaches, communities can be empowered with the tools, knowledge, and motivation to enact meaningful change. Promoting sustainable lifestyles requires not only systemic shifts at the institutional level but also individual behavioral transformations. While large-scale solutions are critical, the aggregation of informed individual choices can significantly influence environmental outcomes.

Applications and Behavioural Change

Citizen Science for Multi-Risk

Insights from the I-CHANGE Project

Francesco Barbano Erika Brattich **Carlo Cintolesi** Prof. Silvana Di Sabatino Niels-Kristian Tjelle Holm **Joy Ommer Anna Molter Juan Esteban** Laura Esbri



April 2025

Take-Home Messages

To achieve the maximum benefits, citizen science activities must be rooted in both scientific (evidence from measurements and observations of the environment) and local knowledge (history of the target area), empowering citizens with the possibility to make a difference.

Technological and non-technological tools offer a powerful possibility for engaging citizens by offering practical means to sense the environment, learn and increase personal awareness, and challenge friends to have an impact. All of this contributes to generating a willing community and providing a longterm perspective to any activity while generating innovative and resourceful data.

Citizens are volunteers, fuelled by motivation and rewarded by the difference their actions can make. Challenges, whether individual or collective, are a great way to motivate participants and support the long-term efficiency of citizen science.

Integrated Modeling Chain for Tailored Interventions

Main achievements:

Insights from the I-CHANGE Project

Francesco Barbano **Erika Brattich Carlo Cintolesi** Peyman Arjomandi Akram Silvana Di Sabatino

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April 2025

Take-Home Messages

Policy briefs

Understanding the impact of emission/concentration reduction policies on citizens' mobility behaviour is pivotal for crafting effective strategies. The use of a numerical modeling chain favours the accurate assessment of policies encompassing various measures, including incentives for public transportation, traffic restrictions in specific zones, the establishment of infrastructure for bicycles and electric vehicles, and urban planning initiatives aimed at creating pedestrian-friendly environments.

Investing efficiently in mobility strategies, tailored to citizens' needs, can support a durable change of habits that makes the policy effective. Mobility changes are effective only if the citizens' reactions are sustainable in reducing emissions. It becomes crucial to foster public-private partnerships as well as citizen engagement to ensure the successful implementation of emission reduction policies and the creation of sustainable urban ecosystems.

Leveraging on a single, yet flexible, methodology, the Integrated Modeling Chain enables to prioritize the interventions through a consistent and effective evaluation of cost-benefits of different scenarios for the local needs.















Conclusions and Remarks

Main lesson learnt

- Improved granularity of data availability through the LLs
- Improved observation of the environment and environmental, social and economic impacts
- Development and validation of 2 original modeling chains for assessment of the effects of behavioral changes on the mitigation of air pollution and climate change
- Impact assessment based on results from a survey based on COM-B model
- Citizen science experiments in the LLs:
 - setup and validation of distributed network of heterogeneous sensing tools
 - awareness rising on climate change and air pollution
 - tailored suggestions for promotion of sustainable lifestyles and reduction of environmental and carbon footprint

Challenges

- Multiple hazards approach in the LLs
- Diversity in the geographical, cultural context and scientific background



Find out more

https://ichange-project.eu/

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