Citizen sciences at the Muséum

Citizen Sciences

Citizen sciences are defined as kinds of scientific knowledge production where non-scientific actors, whether individuals or groups, participate in active and deliberate way

(Houllier, 2016)

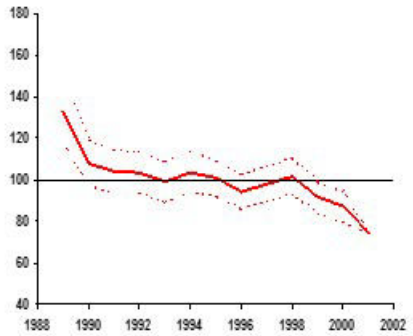
Citizen sciences are structured around 3 promises (Strasser et al. 2018) :

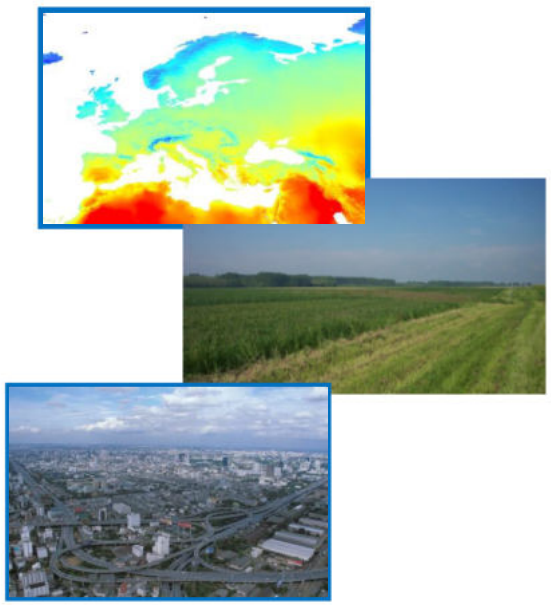
- Science education
- Democratization of science
- Production of a new science

They cut across : education, research, relationship between science and society

Citizen sciences :
an answer for 2 challenges

1. production of data for knowledge





2. promote citizen empowerment

INSTRUCTIONS

POUR

LES VOYAGEURS

ET

LES EMPLOYÉS DANS LES COLONIES

SUR LA MANIÈRE DE RECUEILLIR

DE CONSERVER ET D'ENVOYER

LES OBJETS D'HISTOIRE NATURELLE

Rédigées sur l'invitation de M. le Ministre de la marine et des colonies

PAR L'ADMINISTRATION

DU MUSÉUM IMPÉRIAL D'HISTOIRE NATURELLE.

CINQUIÈME ÉDITION.

PARIS

IMPRIMERIE DE L. MARTINET,

2, RUE MIGNON.

1860

SUR LA MANIÈRE DE RECUEILLIR

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LES OBJETS D'HISTOIRE NATURELLE

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CINQUIÈME ÉDITION.

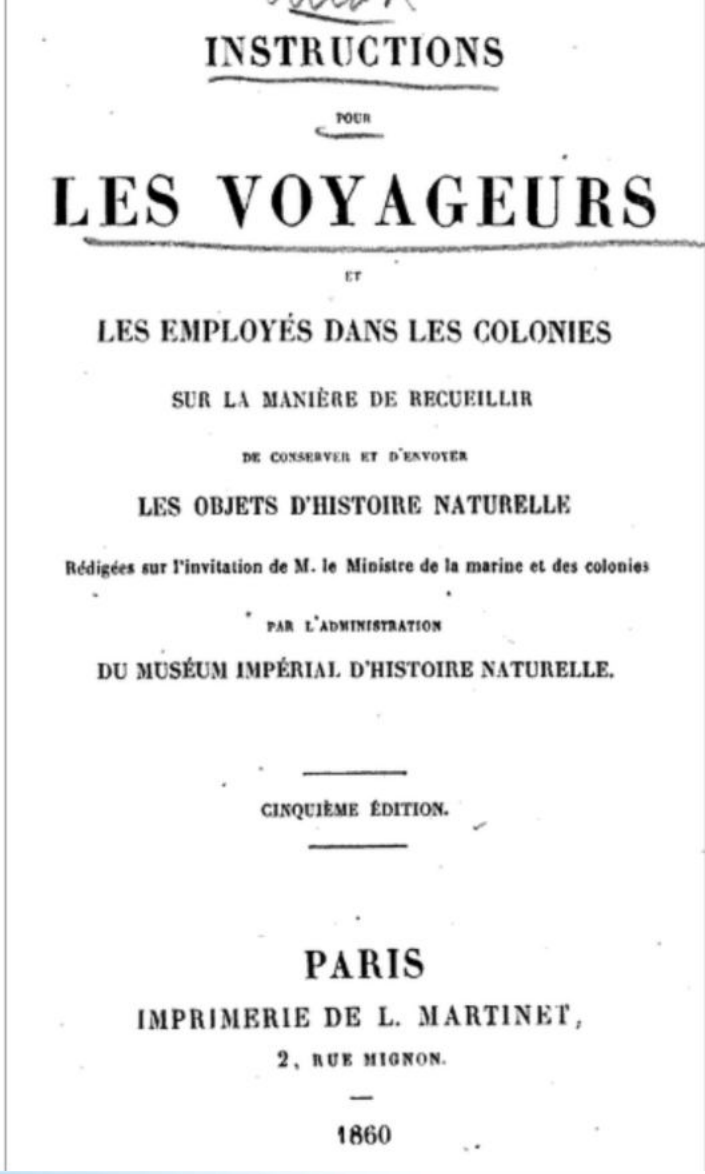
Historical foundations

Amateurs and sciences

- High porosity until the research professionalisation
- Field surveys, specimen collections, taxonomic identifications, analysis of archives

Several « histories » :

- Amateurs (ecology)
- Research Action (human and social sciences)
- Collective mobilisation (medicine)
- Conflicts between States and indigenous people
- Participatory urban planing…



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Citizen sciences at the Muséum : diversity of approaches and pratices

Historical approach: collecting (naturalist), observation (astronomy)

Motivations : curiosity, impact ambition…

Targets : knowledge production, indicators, education

Amplification : *Crowdsourcing*, digital developments, gamification, database…

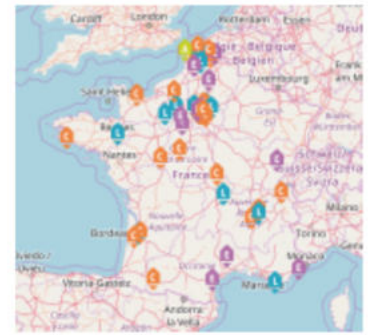
VIGIENATURE
Un réseau de citoyens qui fait avancer la science

About twenty participatory programmes about society-environment- bio-geo-diversity

VIGIENATURE

Un réseau de citoyens qui fait avancer la science

Coastal : inventory, counting (living beach, teaching marine areas, Vigie Plankton)



Vigie-Nature école: discovery and implemetation of protocols

Les Herbonautes : documentation herbarium scanned and on-line

Vigie Ciel : meteorites

Géo-patrimoine : geological and paleontological outcrops,

Wall coatings erosion

…

Participatory action Research
Community based research

Approach : action research (Kurt Lewin, Chambers, Paolo Feire…) and research with the community

Motivations : acknowledgement, improve the living conditions, societal challenges

Targets : knowledge production, *empowerment*, social changes

Amplification : CDB, participative democracy, technological advances, open science

and some reflective researches about participatory

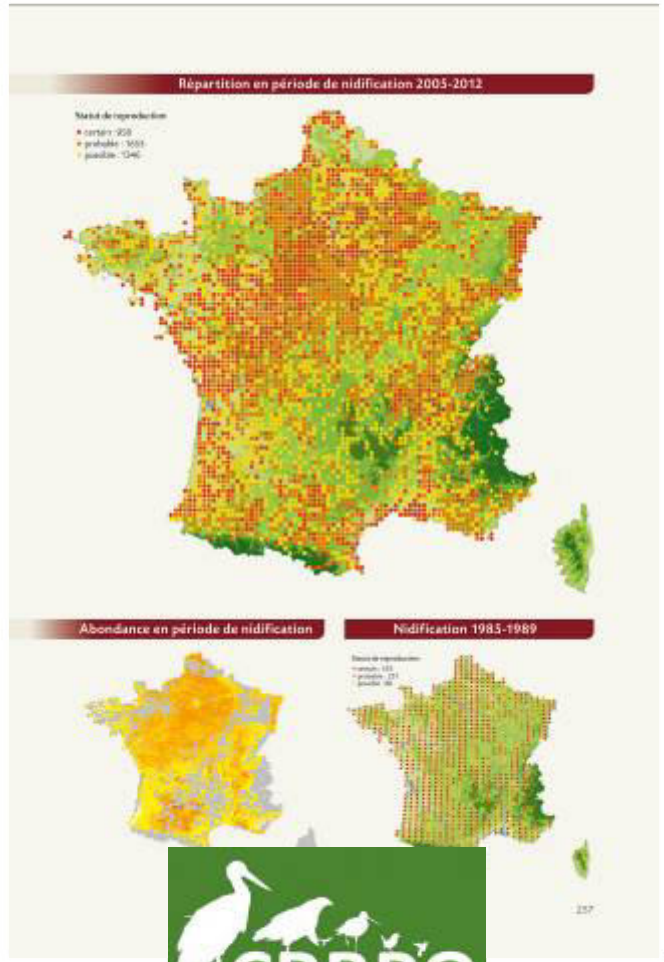
- Change in researchers activities
- Communities motivations
- Data robustness
- Research process…

Knowledge accessible to the general public

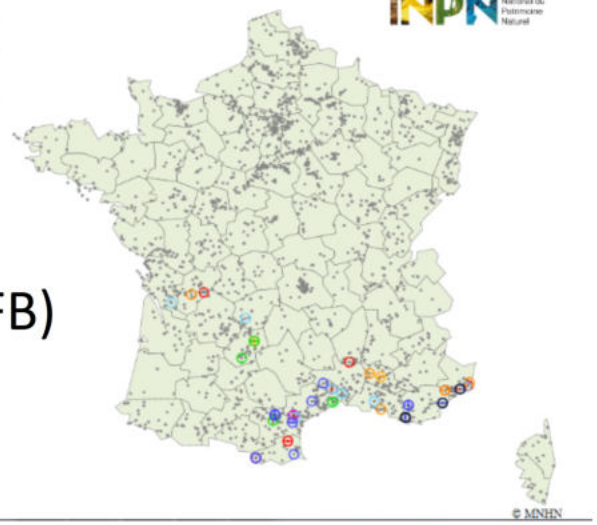
Secretary fauna-flora
Department of natural heritage

Hervé Maurin, 40 ans, est depuis 1989, Directeur de "Secrétariat de la Faune et de la Flore" du Muséum National d'Histoire Naturelle (Paris).

Association of amateurs federation
Protocols for data collections
Inventory, map



Système d'information national et Inventaire National du Patrimoine Naturel



UMS PatriNat (CNRS – MNHN – AFB)

Knowledge accessible to the general public

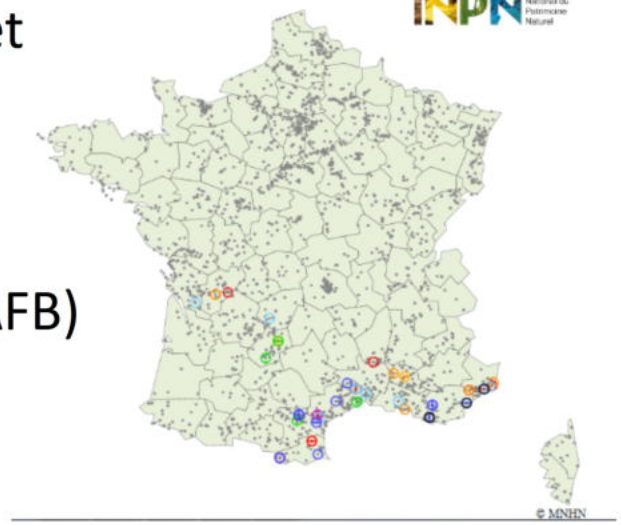
Secretary fauna-flora
Department of natural heritage

Association of amateurs federation
Proto
Inven

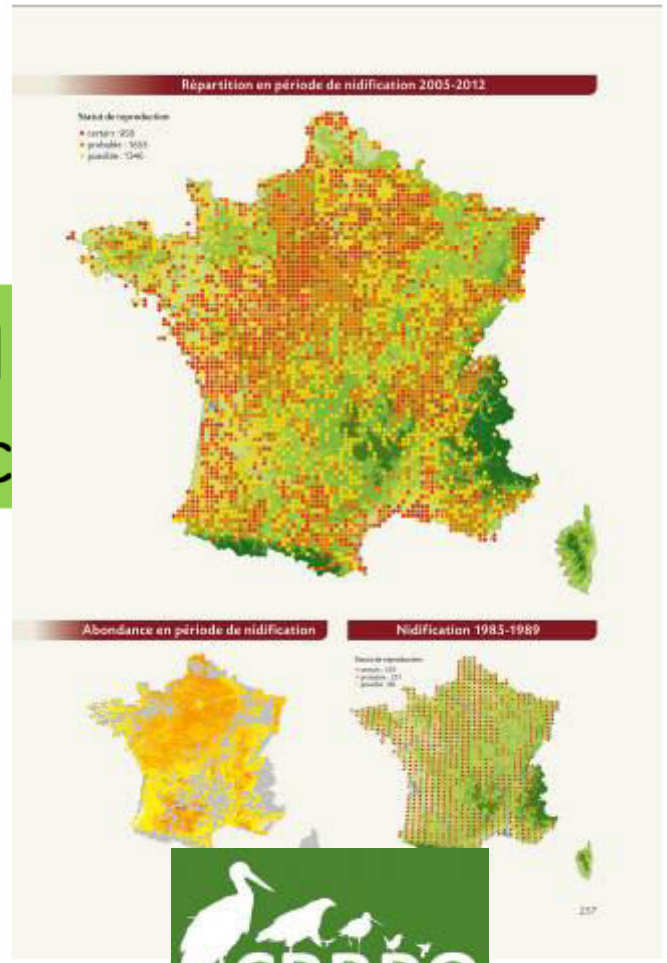
Citizen sciences articul … MN
Infrastructure for pro … ta c

INPN Inventaire National du Patrimoine Naturel

Système d'information national et
Institut National du Patrimoine
Naturel



UMS PatriNat (CNRS – MNHN – AFB)



CRBPO
MUSEUM NATIONAL D'HISTOIRE NATURELLE

GBIF
gbif France

Conservatoire Botanique National
BASSIN PARISIEN

An exemple of participatory research : What contributions?

PROJET SOUTENU PAR FONDATION DE FRANCE

Aranui 3 Freighter to Paradise

PALOC PATRIMOINES LOCAUX

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

CODIM COMMUNAUTÉ DE COMMUNES DES ÎLES MARQUISES

©Danee Hazama

Partners and general objectives

3 partners

- Scientists
- NGO
- Manager of marine protected areas

General objectives

- Build accessible and shared knowledge on marine cultural heritage
- Build together the managment of this heritage and creating a marine protected areas

Several constraints for a participatory mapping method

Space specificities

Time dimension

Political

Institutional

Cultural

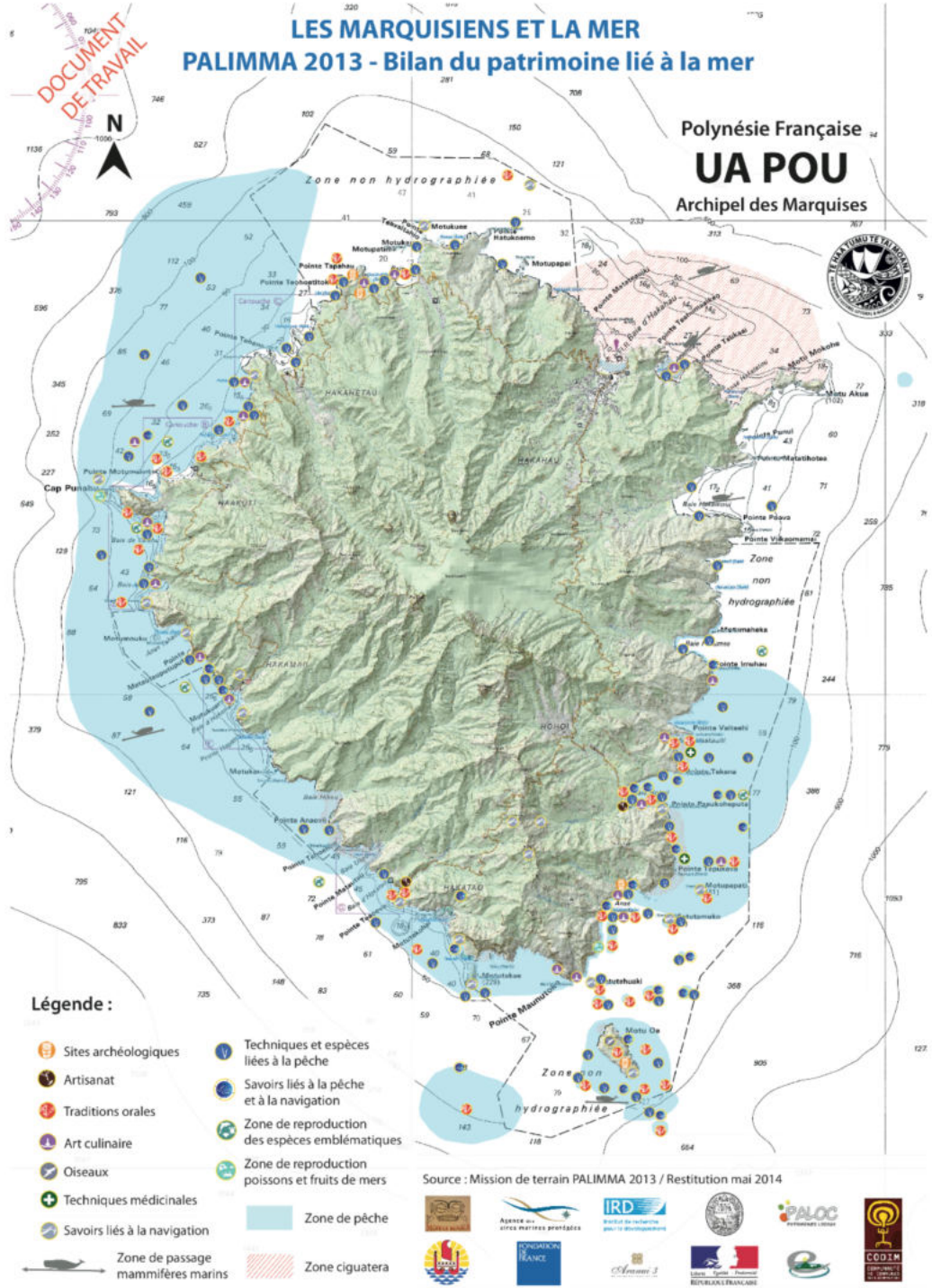
Financial

Scientifics

69
42
73
43
64
Cartouche B
Pointe Motu
HAAKUTI
Baie de Vaie
Tukeokeo
Moukataatoko
Tahakapaaoa (Pointe)
Crustacé

Database creation

And creation of a GIS (Geographic information system)


LES MARQUISIENS ET LA MER
PALIMMA 2013 - Bilan du patrimoine lié à la mer
DOCUMENT DE TRAVAIL
N
Polynésie Française
UA POU
Archipel des Marquises
Zone non hydrographiée
HAKANETAU
HAKAHAU
HAAKUTI
HAKAMAII
HOHOI
HAATAO
Légende :
Sites archéologiques
Artisanat
Traditions orales
Art culinaire
Oiseaux
Techniques médicinales
Savoirs liés à la navigation
Zone de passage mammifères marins
Techniques et espèces liées à la pêche
Savoirs liés à la pêche et à la navigation
Zone de reproduction des espèces emblématiques
Zone de reproduction poissons et fruits de mers
Zone de pêche
Zone ciguatera
Source : Mission de terrain PALIMMA 2013 / Restitution mai 2014

Challenges from the point of view of the scientists

Collecting data :

- Maintain a rigorous method une méthodologie rigoureuse
- Avoid over-interpretation of qualitative data

Database building :

- Typologie building takes into account the various partners
- With quality data

Dissemination og data

- Sensitive data

What contributions

- Building together a knowledge a expertise valitated by all → Confidence in the expertise
- Building a common good
- Quality of the scientific method → legitimacy of the process and the data

- Intergenerational transmission
- Opportunities for everyone to participate in the building ok knowledge according to each one's competences and point of view
- Various discussion arenas depending on the structuration of the society →

- Debate about the data and the land management from the data collecting to the decision buiding

Particular attention

- Who are the participants?
- How digital tools can improve/or not the process → community's opening, discussion in a long wiew without scientits
- Be careful about ephemizing, distancing the conflicts
- Standartized process can calibrate confine the knowledge → How afford the expression of various point of view, enviromental links?
- Citizen sciences / indigenous knowledge
- Scientific projets are becoming new political places : what changes?
- Relationship science-society : asymmetry or horizontalisation

Innovations in citizen sciences

Citizen Science:

quality data ; collective artificial intelligence

Romain Julliard et al.

Where do we comme from?

VIGIENATURE

Un réseau de citoyens qui fait avancer la science

National monitoring of biodiversity through citizen science

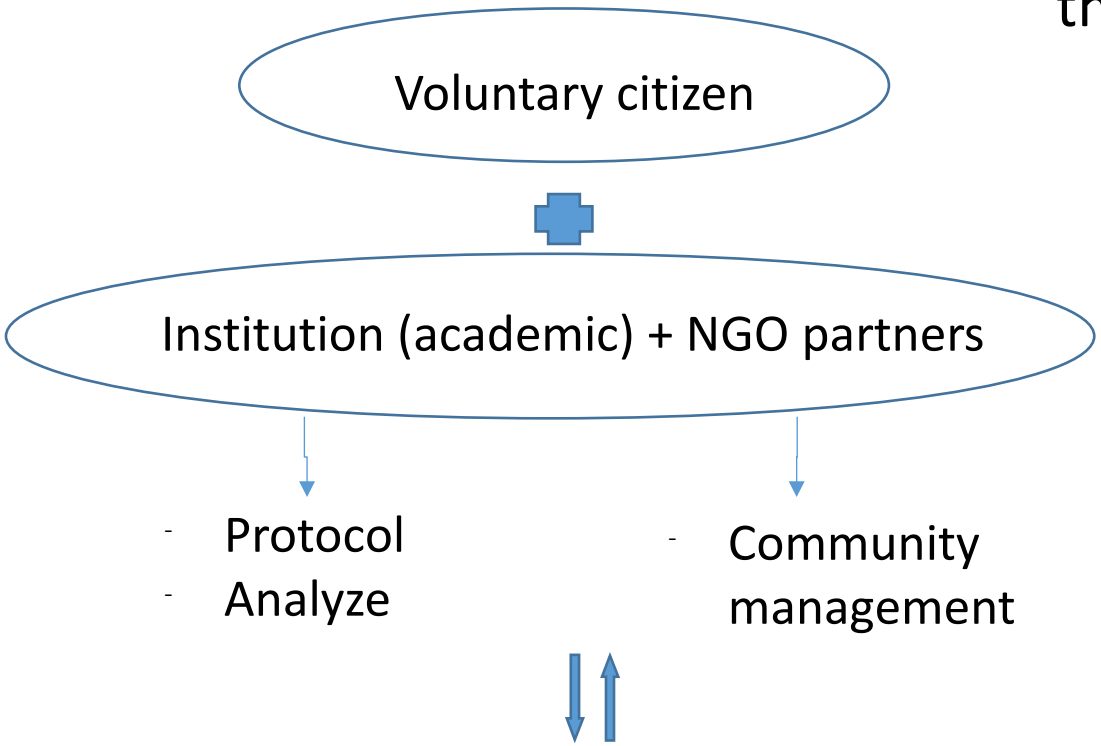
- ⇒ 15 years of experience
- ⇒ 15 CS projects (skilled amateurs, ordinary public, teachers, farmers…)
- ⇒ >100 scientific international publications
- ⇒ 15 000 active participants each year

Data for research
Biodiversity indicators for decision makers
Empowerment of participants

“Institutional” citizen science:

VIGIENATURE
Un réseau de citoyens qui fait avancer la science

National monitoring of biodiversity through citizen science



- ⇒ 15 years of experience
- ⇒ 15 CS projects (skilled amateurs, ordinary public, teachers, farmers…)
- ⇒ >100 scientific international publications
- ⇒ 15 000 active participants each year

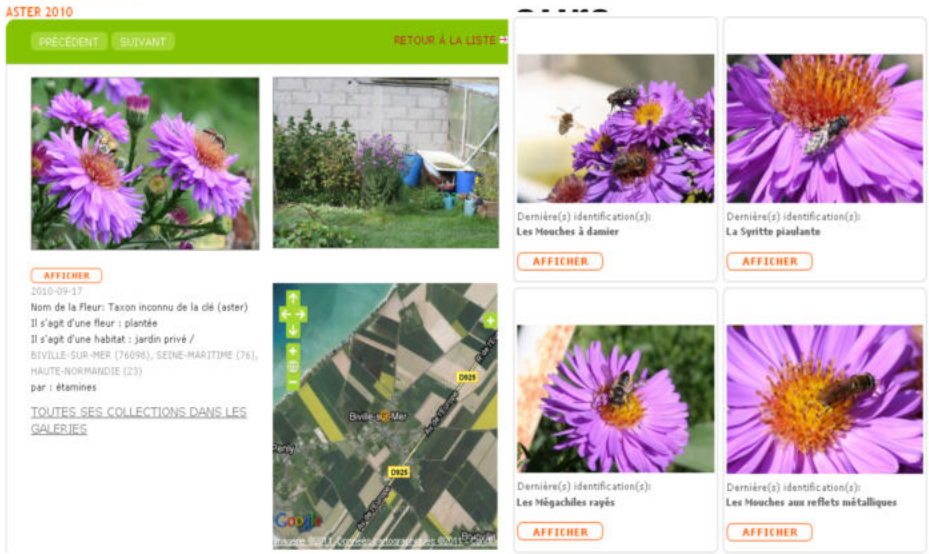
Other stakeholders: State, local government and municipality, education, nature protection…

Data for research
Biodiversity indicators for decision makers
Empowerment of participants

A first lesson from our experience

SPIPOLL

Suivi Photographique des Insectes



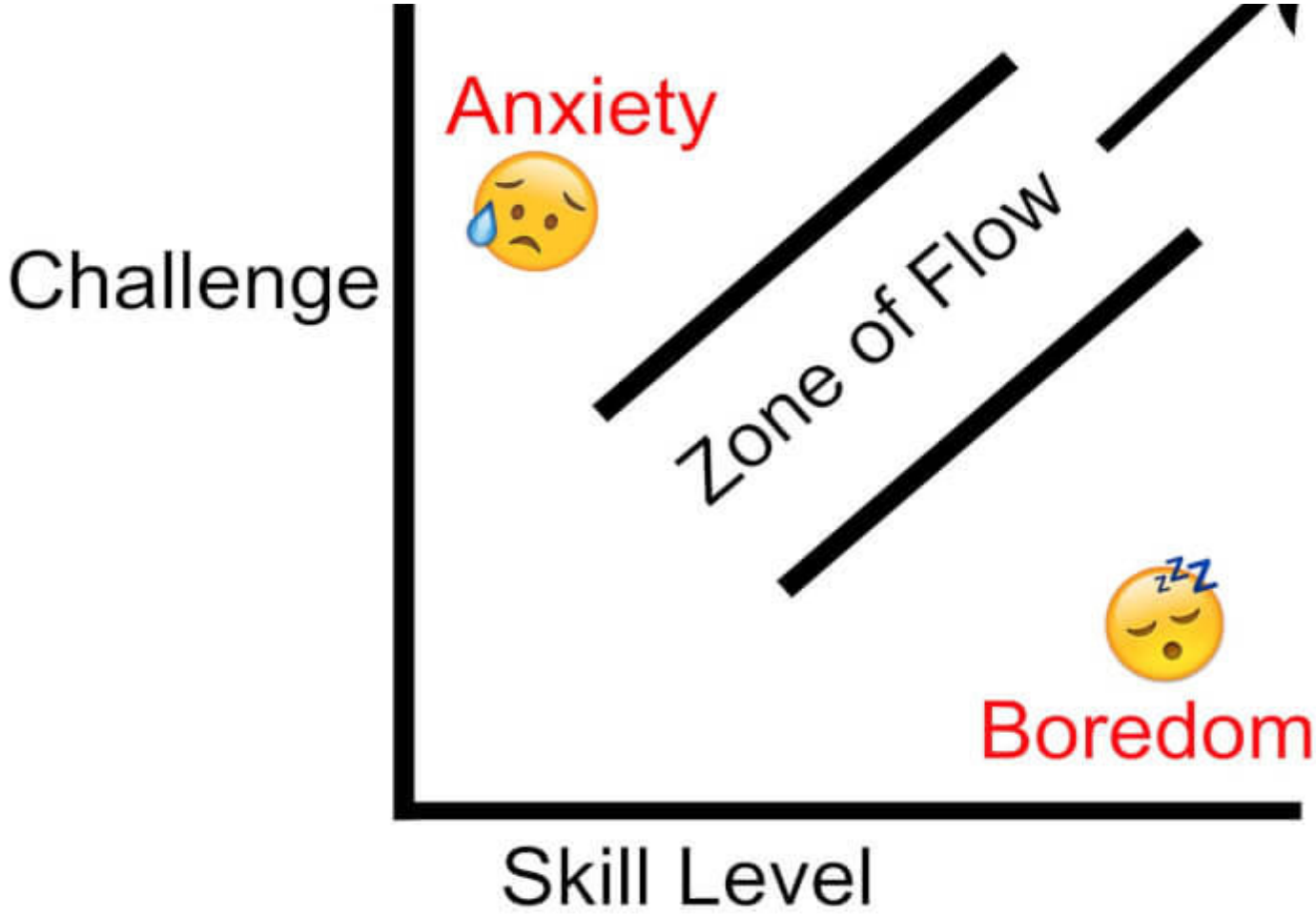
BIRDLAB

A first lesson from our experience:

- A positive correlation between scientific data quality et participant engagement

« it must be [redacted] funny otherwise people do not participate »

Find the optimal Optimal experience (Csíkszentmihályi Mihály) :



Structured data / based on protocol:

observations ;

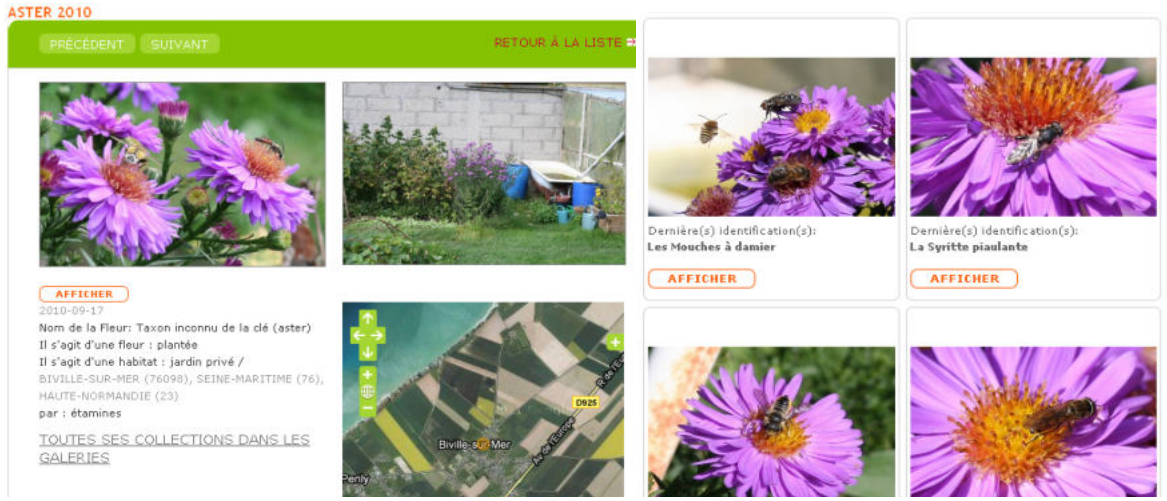
Situated, intentional data, enriched with local knowledge and own participant experience

Human's skills

Individual specific contribution

A secon lesson from our experience

The importance of the social plateform for data quality control



COMMENTAIRES DES INTERNAUTES

par : cybelle 2011-04-23

Superbe votre collection Etamines, les insectes se bousculaient pour vous faire plaisir, vous avez dû vous régaler.

par : Fernand 2011-04-23

Très belles photos. Les fleurs sont magnifiques et les insectes également. Beau travail étamines .

The importance of the social plateform for data quality control

- Imitation
- Advices
- Social control

The importance of the social plateform for data quality control

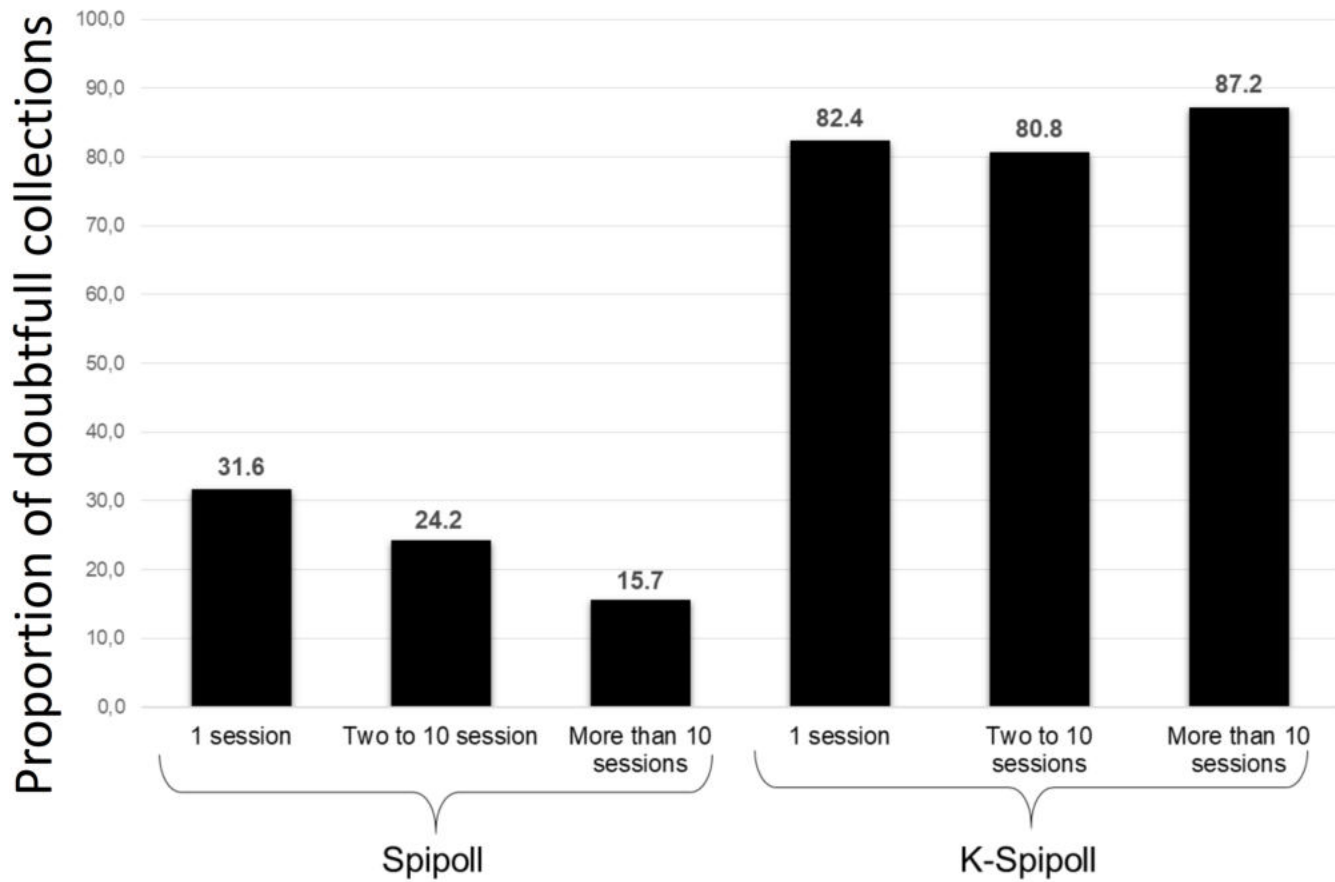
Comparaison France / South Korea

SPIPOLL

Same protocole but:

Photo galery, instead of structured data

Same amount of participation on fisrt year


Proportion of doubtfull collections
100,0
90,0
80,0
70,0
60,0
50,0
40,0
30,0
20,0
10,0
0,0
31.6
24.2
15.7
82.4
80.8
87.2
1 session
Two to 10 session
More than 10 sessions
1 session
Two to 10 sessions
More than 10 sessions
Spipoll
K-Spipoll

The importance of the social plateform for data quality control

- Imitation
- Advices
- Social control

The power of social interaction among participants for developing data quality control

=> structured data (participations) are **visible by all** (they then serve as tutorial for new comers), **commentable by participants**, and may be eventually **modified by the author** (a new version is then created and old ones stored)

Citizen science : the martingale

Web site

- **visible by all**
- **Commentable by participants**
- **Modifiable by auteur (version)**

Participant

Imitation

advices, help

Quality control

Outcome

Homogeneous data

Shared learning
Sense of belonging

=> High added-value data

What we learned in scientific textbook:

Data should be independent from each other

Observers should be trained
=> homogeneous skills

Data should be validated by experts

What we actually recommand:

Imitation resulting in data contamination

Allow individual participant to progress while participating

Encourage the community of participants to build its own rules of deliberation on data quality

Short and long term consequences of citizen-science projects to participant's connection to nature

Anne-Caroline PREVOT

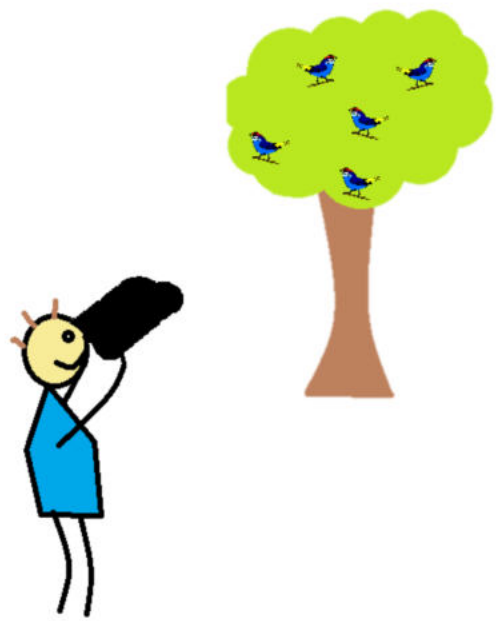
CESCO
Centre d'Écologie et des Sciences de la Conservation

MUSEUM NATIONAL D'HISTOIRE NATURELLE

Citizen-science programs…

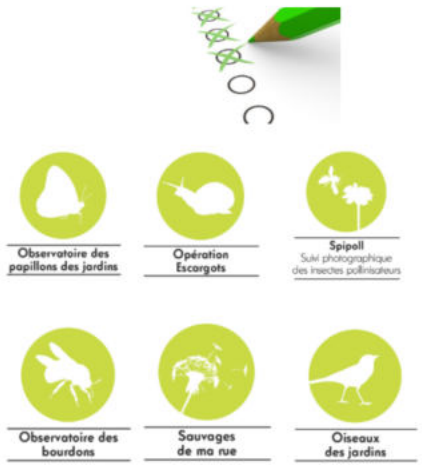
Contribution to science
Knowledge acquisition (education)

And… ***connection to nature***?



- Biodiversity representation and knowledge?
- Environmental values ?
- In-group social identity ?
- Practical knowledge ?
- Habits and routine ?

Methods – French *Vigie-Nature* biodiversity observatories



Questionnaire intended to all participants

1723 answers

Unpublished

Anthropological approach

30 in-depth interviews

Cosquer et al. 2012 *Ecol Society*

VIGIENATURE École

Questionnaire + Drawing

Intended to urban pupils that were commited to Cit. Science or not

400 pupils

Prévot et al. *in prep*

Grand public

Enquête hiver 2014-2015

VIGIENATURE
Un réseau de citoyens qui fait avancer la science

3173 réponses
1891 participants à Vigie-Nature

Observatoire de la biodiversité des jardins

1145

Observatoire des bourdons

325

Oiseaux des jardins

521

SPIPOLL
Suivi photographique des insectes pollinisateurs

143

Sauvages de ma rue

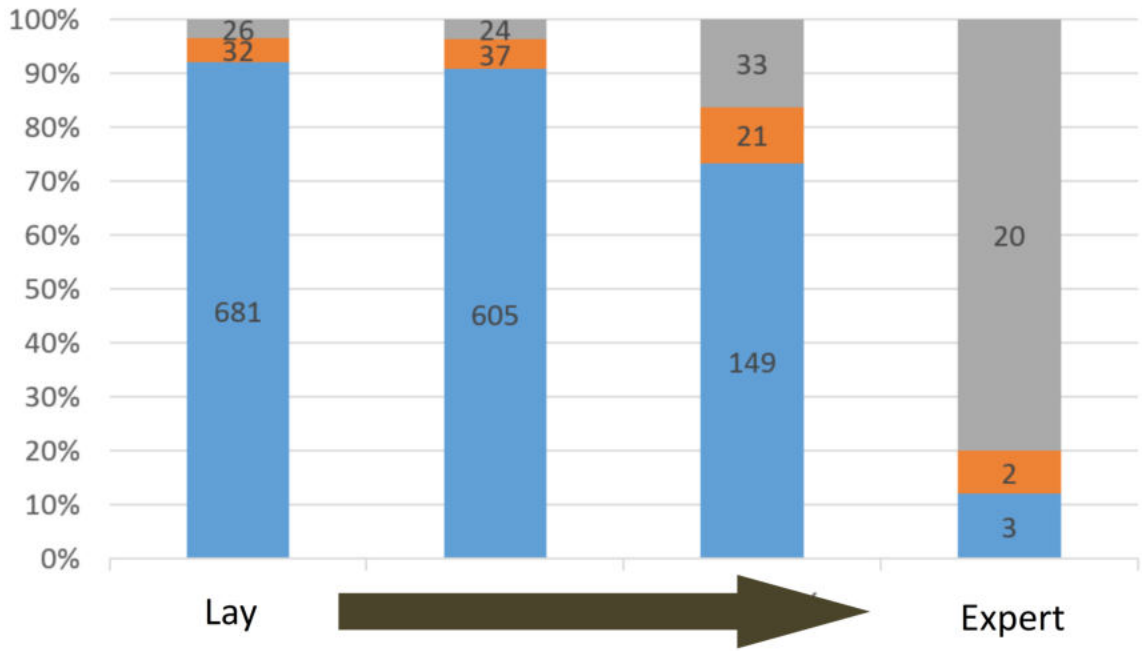
162

Grand public

Profil des participants (n=1891)

- Sous représentation des classes d'âge les plus jeunes
- Sur représentation des catégories socioprofessionnelles « supérieures » par rapport aux professions les moins qualifiées

Volunteers to Vigie-Nature Citizen-science programs



Do you think your biodiversity knowledge …

… did not increase

… increases and reached a maximum

… increased and can increase more

Self-reported knowledge acquisition for lay-people

Raisons for success

- Motivation to participate:
  - > contribute to science
  - > self-learning !

« Before, in my garden, there were only butterflies, now, there are painted laidies, red admirals, swallowtails »

Participant interview (among 30):

- *« J'ai toujours été intéressé par tout ce qui était science. Bon là c'est vraiment très modeste, mais c'est l'idée de se dire qu'on peut participer justement en tant que non scientifique… »*

(Femme, soixantaine, côte Méditerranéenne, mariée, enfants, sans profession)

- *« En fait, à partir du moment où j'ai regardé les papillons, j'ai appris, je les ai connus, et c'est vrai que je ne savais pas tout ce qu'il y avait comme diversité. Et ça je trouve que c'est une expérience extraordinaire. »*

(Femme, cinquantaine, Ile-de-France, mariée, enfants, sans profession)

- *« Le petit dernier qui a cinq ans (…), il connaît deux, trois quatre noms de papillons. Il arrive à les reconnaître. Donc,*

Voluntary butterflies monitoring

General environmental concern

Confidence in science and museum

Biodiversity monitoring at school

Conservation psychology approach
400 pupils (age 11-13) from 29 classes in very dense urban context

Questionnaire	**Drawing**
Environmental values Outdoor activities	Urban garden they would dream of

Unpublished

Biodiversity monitoring at school

Environmental Values (Stern and Dietz 1994)
Scale adapted for children by Schultz

« At the TV, you can hear a lot about environmental issues. For you, for whom is it the most problematic? »
(3-level Likert scale)

My future
My health → Egoistic
Myself

Children
Human → Altruistic
My family

Insects
Birds → Biospheric
Plants

Biodiversity monitoring at school

VIGIENATURE École

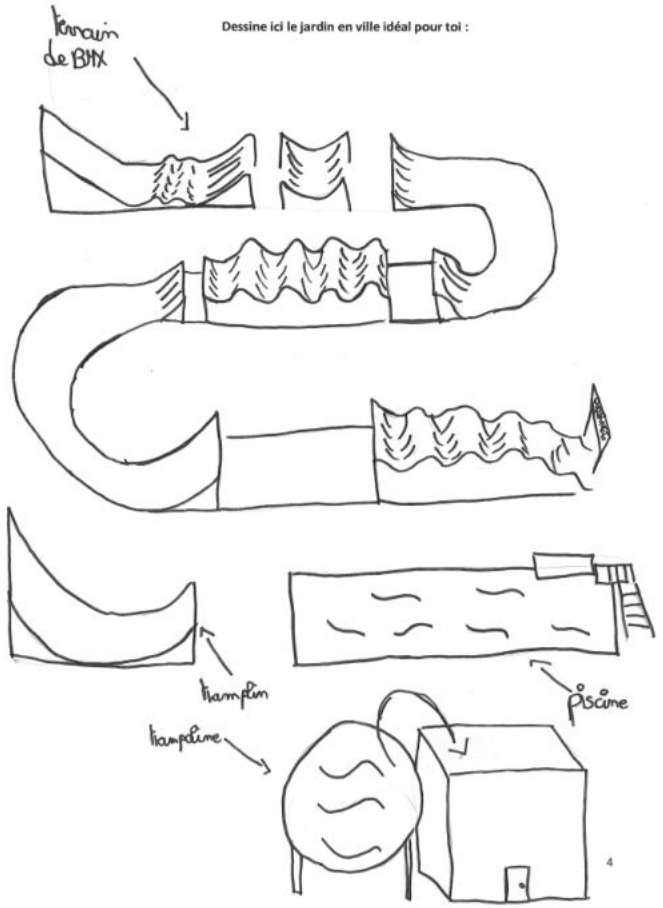
Natural elements: 8
Built elements : 0
Human presence: no

Biodiversity monitoring at school

VIGIENATURE École

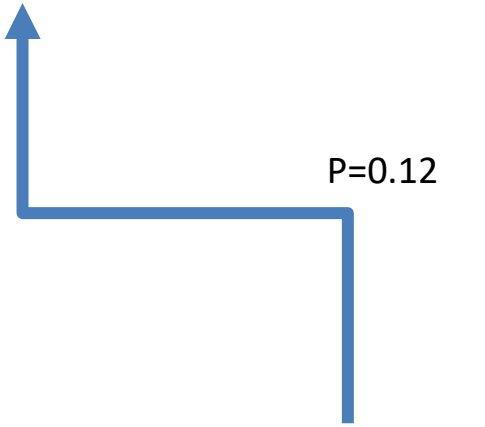
Natural elements: 4
Built elements : 3
Human presence: yes

Biodiversity monitoring at school



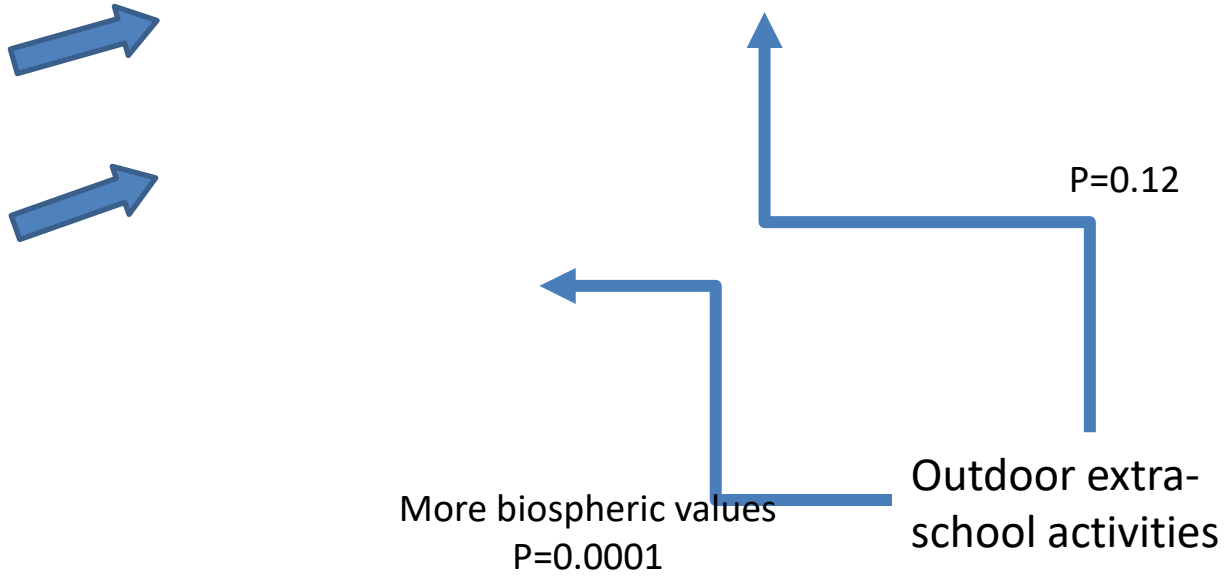
Natural elements: 0
Built elements : 4
Human presence: no

Biodiversity monitoring at school



VIGIENATURE École

Biodiversity monitoring at school



VIGIENATURE École

New projects, new tools

Our know-how gets exported

Particip-arc : structuring « cultural participatory researches »

ParticipArc

Recherche culturelle et sciences participatives

PARTICIP-ARC (janvier 2018-juillet 2019)
Cultural researches and citizen sciences

ParticipArc
Recherche culturelle et sciences participatives

Build a a network for …

- Visibility and recognition of this kind of scientific researches
- Increase skills (individually and collectively)
- Value the role of participants.

Ask for experiences :

- Scientific, technical, social, legal, ethic, economic questions
- Technological tools

Develop a prospective thinking for the culture Ministry : opportunity and

PARTICIP-ARC

A diversity in the network

- archiving, libraries
- Museum
- heritage
- Architecture
- Archeology
- Art, music
- Linguistic…

Sharing experiences allows innovations

Common questions

- Citizen sciences perimeters
- Evolution of the profession of researcher
- Need of support jobs (communication, legal issue…)
- Facilitate the relationship between professional researchers and participants
- Better engage the participant
- Valuing participation
- Evolution of research organisation

ParticipArc

Recherche culturelle et sciences participatives

Strenghts

Diversity participating models

Strong interest among researchers

Fast technological developments

ParticipArc

Recherche culturelle et sciences participatives

Weaknesses

Siloed research organizations

Uncertainty about the future of the projects

Difficulties in developping skills on organizational, technical and legal questions

Opportunities

Popularity of citizen sciences

Scientific recognition through high level publications

Database maturity

ParticipArc

Recherche culturelle et sciences participatives

Threats

ParticipArc

Recherche culturelle et sciences participatives

A constant risk of confusion between citizen sciences and other kinds of of partipation (in particular for education purpose)

civil society willingness to participate beyond research capacity to handle it

Strong institutional inertia

Lack of fundings