

CleanAtlantic

Tackling marine litter in the Atlantic Area

Citizen Science and Marine Litter

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CleanAtlantic Workshop
9 may 2019
Vigo. Spain



Citizen Science

Definition

“Citizen Science refers to the general public engagement in scientific research activities when **citizens actively contribute to science** either with their intellectual effort or surrounding knowledge or with their tools and resources” (*European Commission, 2014*).



European Political Context

Citizen Science is aligned with:

European 2020 strategy which has three priorities: smart growth, sustainable growth and inclusive growth.



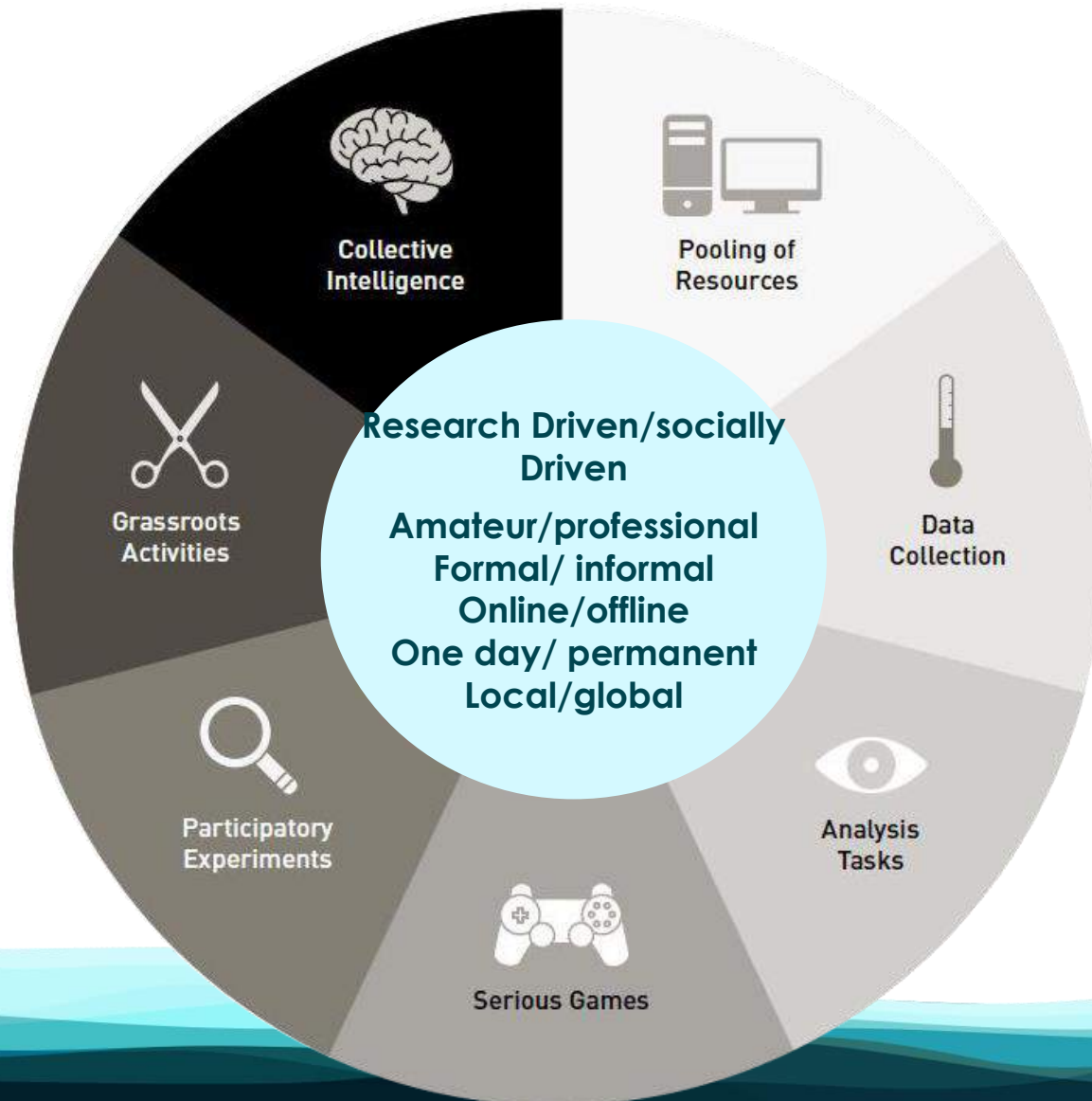
✓ **7th Framework Programme for the research and the innovation H2020.**

✓ **Digital Agenda for Europe as element of the “Digital Science”:** open, creative and close.

✓ **RRI Program**, Responsible Research and Innovation. “Science in Society” is now “Science with and for society”.

Funding: in Europe: **H2020** and in Spain: **FECYT** (among others options).

Model and level of participation



Outcomes

Publications	Sustainability
Findings	Consciousness
Critical mass	Skills
Low -cost	Knowledge
Crowdsourcing	Empowerment
Innovation	Debate
Legislations	Emotions
Relationships	Identity
Conservation	Ownership

(Source: Project Societize. White paper, 2014)

Marine litter

Definition

‘....any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment’ (UNEP, 1995)



2010: **8 millions Tn** of plastic waste in the ocean (Jambeck et al., 2015).

Marine Litter

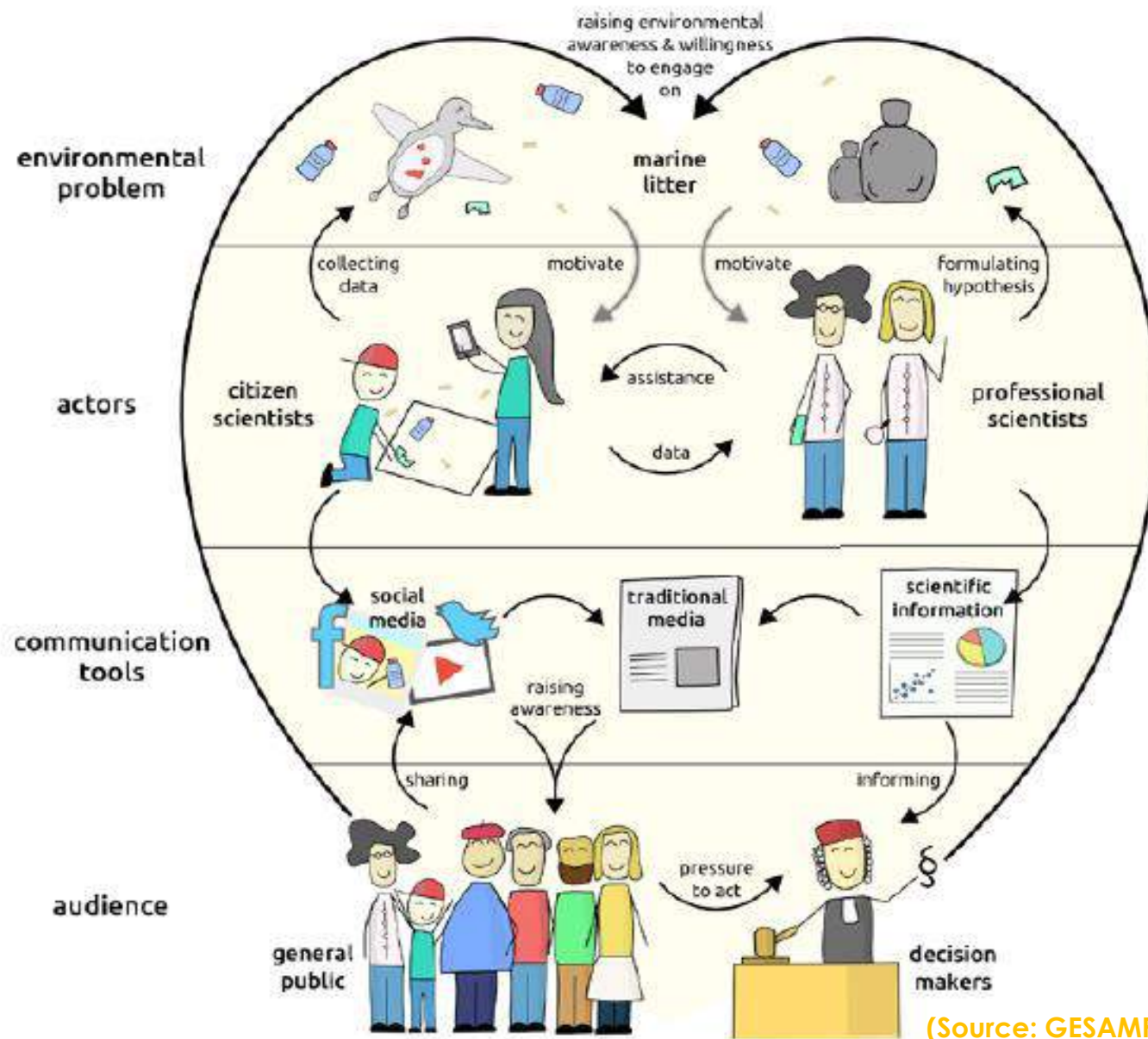
European Political Context

- 2008. Marine litter is one of the priorities of the **Marine Strategy Framework Directive** (descriptor 10) to improve the good environmental status of the sea before 2020.
- **Circular Economy Program:** Action Plan: *Closing the loop*".
- 2018. **European strategy of the plastics**, to achieve their transformation.
- There are Experts groups in Europe (**GESAMP-WG40**) and in Spain (**GT-CONAMA**)
- Funding for CC&marine Litter: Europe **H2020, LIFE; Interreg**; Spain: **Ej. FB (MITECO)**



Citizen Science Role

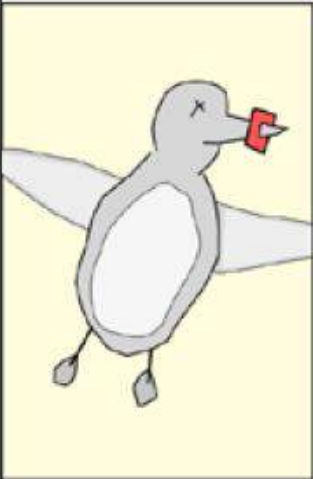
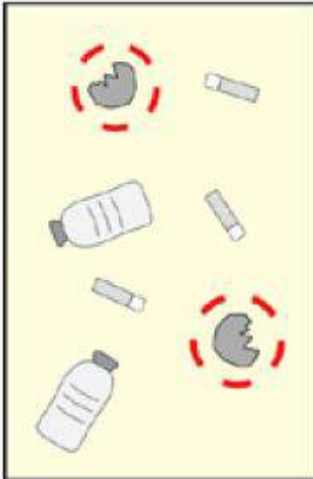
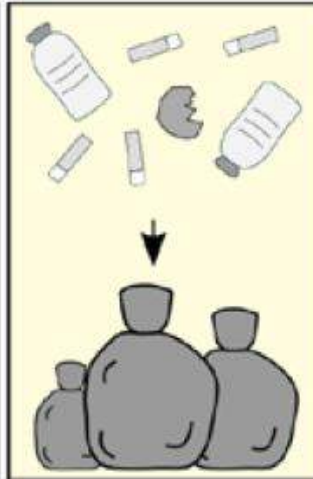
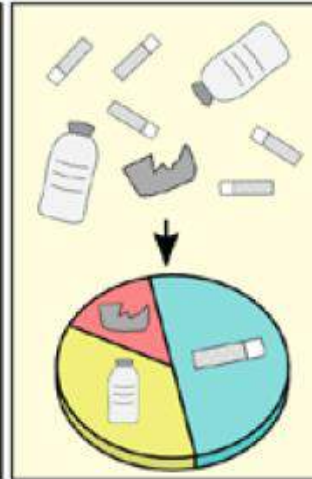
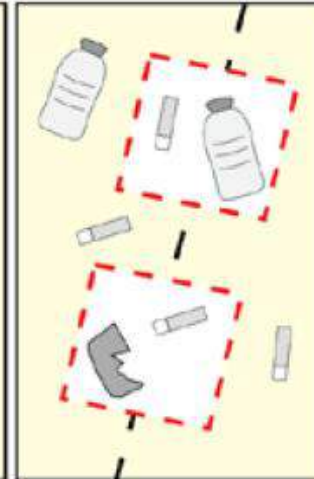
Citizen Science contributes to the **raise awareness and engagement** related to this global issue and promotes **habits changes and positive reactions** in the general public and also in the policy makers.



(Source: GESAMP, 2019)

Models of participation

Citizen Science and Marine Litter

observation of impacts of marine litter	sampling of specific litter items	estimation of litter quantities	frequency of litter items	quantitative data on litter densities
				
incidental observation	targeted sampling	generation of single data points	analysis of sample, generation of frequency data, data evaluation	sampling with specific method, analysis of sample, generation of quantitative data, data evaluation
analysis of sample, data evaluation, publishing	analysis of sample, data evaluation, publishing	analysis of data, data evaluation, publishing	publishing	publishing

Marine litter monitoring by scientific citizens contributes:

- ✓To identify the main **types of litter**.
- ✓To evaluate the **origin and impact** of marine litter.
- ✓To design reduction strategies and to know their **effectiveness**.

The level of participation of citizens is conditioned by the **type of responsible organization**, among others.

(©Kiessling &Thiel Source GESAMP, 2019)

Marrine compartments with marinelitter



Citizen Science and Marine Litter

Shoreline

- ✓ Many studies have been conducted on **sandy beaches** because of their **easy access**, their **attraction for people** and because beaches are places of **marine litter accumulation**.
- ✓ Participation: notification of **accidental findings**, **specific sampling collection**, analyses, publication..
- ✓ Surveys: surveys conducted **autonomously by scientific citizens** or surveys **supported by professional scientists**.
- ✓ Methodology: use of protocols of **available programs**



Photo Guide –Program for monitoring marine litter in beaches

OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic

Shoreline



Citizen Science contribution:
“additional data”
4 campaigns/year

Plastics • Polystyrene		Rubber		100 metre
	<div>Logotype</div> <div>Spetsbrygg/Skottbrygg</div> <div>Agustín y alcohólico de bebida</div> <div>Isuado de espuma o coque</div> <div>Kontainerpoppens on "party poppers"</div> <div>Bergpoppens on "party poppers"</div> <div>Lokaler och turistpoppens</div>		<div>Skole</div> <div>Skole</div> <div>Skole</div> <div>Skole</div> <div>Skole</div> <div>Skole</div> <div>Skole</div>	
20 Ten & party poppers		20 Shoe		
	<div>Logotype</div> <div>Spetsbrygg/Skottbrygg</div> <div>Agustín y alcohólico de bebida</div> <div>Isuado de espuma o coque</div> <div>Kontainerpoppens on "party poppers"</div> <div>Bergpoppens on "party poppers"</div> <div>Lokaler och turistpoppens</div>		<div>Skole og skole</div> <div>Skole & skole</div> <div>Skole og skole</div> <div>Skole og skole</div> <div>Skole og skole</div> <div>Skole og skole</div> <div>Skole og skole</div>	
20 Ten & party poppers		20 Shoe and belt		
	<div>Logotype</div> <div>Spetsbrygg/Skottbrygg</div> <div>Agustín y alcohólico de bebida</div> <div>Isuado de espuma o coque</div> <div>Kontainerpoppens on "party poppers"</div> <div>Bergpoppens on "party poppers"</div> <div>Lokaler och turistpoppens</div>		<div>Skole</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div>	
21 Cup		21 Shoe (if leather)		100 metre
	<div>Logotype</div> <div>Spetsbrygg/Skottbrygg</div> <div>Agustín y alcohólico de bebida</div> <div>Isuado de espuma o coque</div> <div>Kontainerpoppens on "party poppers"</div> <div>Bergpoppens on "party poppers"</div> <div>Lokaler och turistpoppens</div>		<div>Skole</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div>	
22 Cardboard/paper/leaves		22 Other leather (other party poppers)		
	<div>Logotype</div> <div>Spetsbrygg/Skottbrygg</div> <div>Agustín y alcohólico de bebida</div> <div>Isuado de espuma o coque</div> <div>Kontainerpoppens on "party poppers"</div> <div>Bergpoppens on "party poppers"</div> <div>Lokaler och turistpoppens</div>		<div>Skole</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div> <div>Skole/Skole (with Lokaler)</div>	
23 Cardboard/paper/leaves				

Types of items:

- Plastic and polystyrene
- Rubber
- Cloth
- Paper and cardboard
- Wood (machined)
- Metal
- Glass
- Pottery and ceramics
- Sanitary waste
- Medical waste
- Faeces
- Others

Citizen Science and Marine Litter Shoreline



OCEAN CONSERVANCY
Asoc. Ambiente Europeo
Internat. Coastal Cleanup

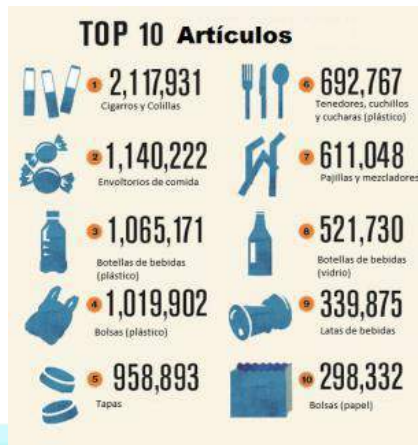
EEA
Marine Litter
Watch

SURFRIDER
Ocean
Initiatives

VERTIDOS CERO
Marnoba



2011. In Spain:
16000 voluntaries
180 organizations
360 clean activities



2017-EU.
30 communities
653.320 items
1407 events

2014.
Cantabria
(Spain)



Mobile apps



Launch date: 2016 **Author:** Asociación Vertidos Cero y Kai Marine Services.

Objective: characterization of the **floating marine litter, marine litter in the coast and in the sea beds** to contribute to the research and the management.

Audience: institutions, associations (fishermen, scuba divers) and the general public.

Potential of Data:

- Geoposition of litter by GPS, litter and environmental data.
- Data submission to the Marnoba platform and the **National Program of Monitoring Marine Litter in beaches (MITECO).**



Marnoba: How to use it?

Citizen Science and Marine Litter

Mobile apps



Active **GPS**. Choose a place and open the formulary



Fill the fields and select the beach



Select the type of item and the right amount of litter



Marnoba: How to use it?

Citizen Science and Marine Litter Mobile apps



Fill the **weight** of each fraction



Area Data: Length and wide of the area (mín. 100 m), date weather, sea, observations.



- The submission of the formulary can be delayed.
- Sent data are visible in the web page

Ocean Conservancy: Clean Swell

Mobile apps

Launch date: 2016 **Author:** Ocean Conservancy (Asoc. Ambiente Europeo)

Objective: to clean the litter (**coast, rivers and lakes**), to contribute to the **Data Base**, to **change habits** and to create **positive reactions in the decision makers**.

Audience: general public. USA, SE Asia, Malaysia, Thailand and Philipins.

Potential/Data:

- Categorization and weight of the litter, geo-position and covered distance.
- Public **recognition in the web: historical records, badge**
- Data:** 265 mil. of items, 150 countries. 2017: 800.000 voluntaries, 20 mill. of items.



Marine Litter Watch



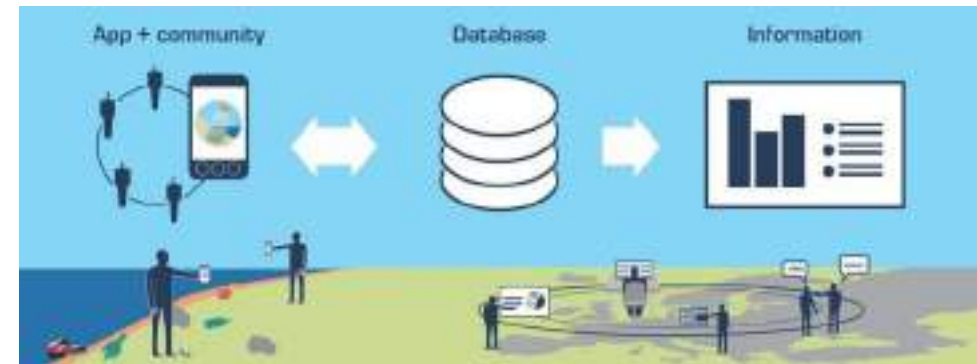
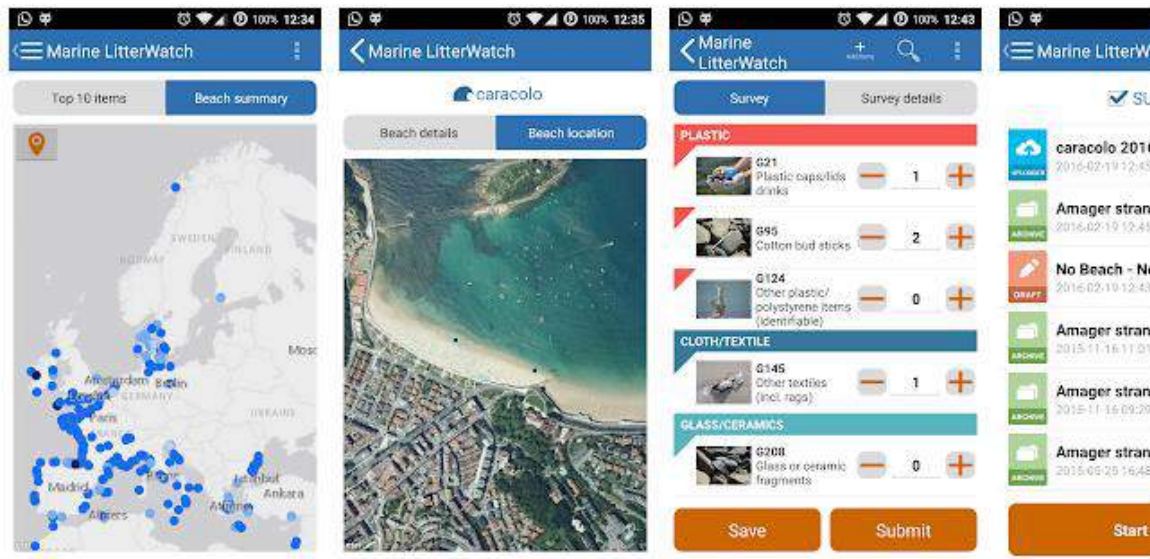
Citizen Science and Marine Litter

Mobile apps

Launch date: 2014 **Author:** Enviromental European Agency

Potential/Data:

- 2 approaches: voluntary clean ups surveys and official surveys.
- It's mainly useful for beaches and shoreline (not for the rivers and the sea).
- Data are submitted to the **MLW data base MLW** located in the **EEA web** to promote future political actions.



Behind the app, ther is a platform to promote the contact of community, to organize events and to create organized groups for clean ups, etc.



Date launch: 2017 **Author:** Jeff Kirschner

Objective: to remove the litter of the nature (cities, beaches and mountains) and to build a dynamic global Data Base.

Audience: general public. (app wiith a preferent use in **Holand, USA, UK.**

Potential data:

-To identify the litter, to show the geoposition, to make photos and to share them in internet..

-It is focussed on the **commercial brands companies and organizations.**

-Some data: **750.000 items in 115 countries**

LITTERATI



Mapa with problematic areas
“the digital print of the litter is different for each place”

Superficial water and water column

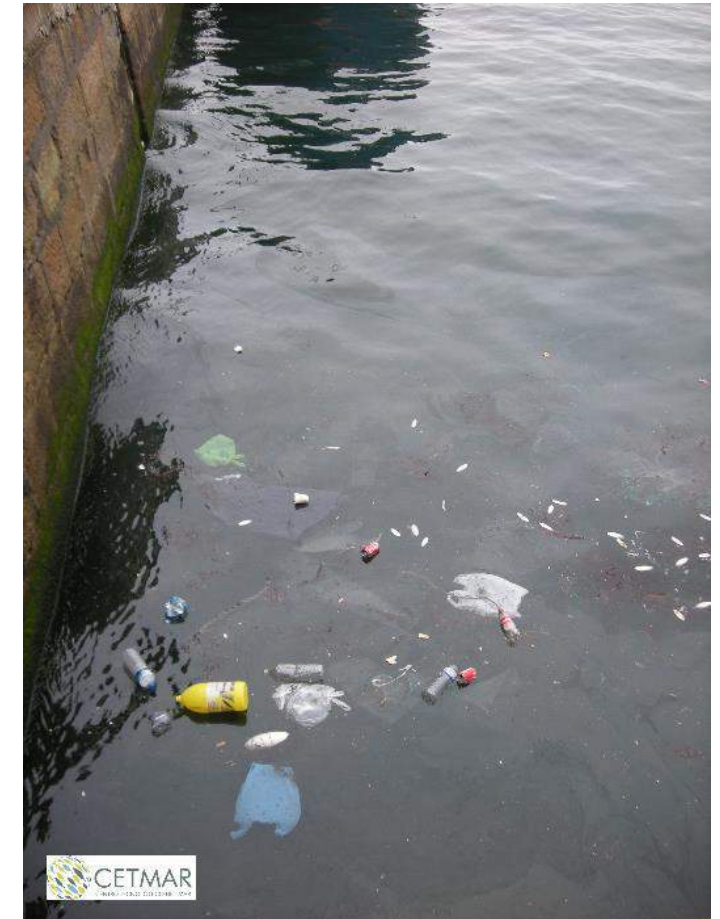
Direct observation of floating macro-litter of the **water surface and water column** during **expeditions** (open ocean) and local surveys (ports, rivers).

Need for **engagement** and use of specific **protocols**:

- Size limits for visual observations:** citizen science observations should be focused on macro, meso and megaplastics and to avoid the microplastics (Kroon et al., 2018).

- Mesh size of net tows:** <1 mm

- Fixed observation period** (max. 0.5-1h) and **fixed sampling area** (eg. 10-m wide strip from the bow of a vessel).



Citizen Science and Marine Litter

Superficial water and water column

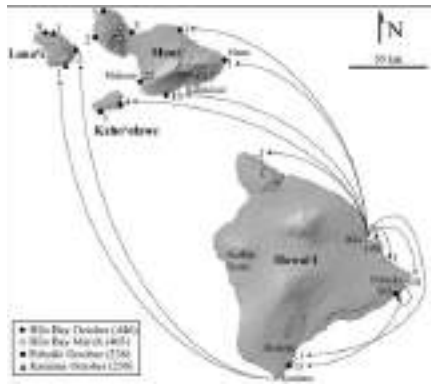
University of Hawaii
Hawai'i Wildlife Fund



5 Gyres Institute



European Commission



- Regular monitoring of the **sea beds** with observation and cleaning activities organized by **recreational and professional scuba divers**.
- Collection of the marine litter (**fishing for litter**) and the abandoned nets (**ghost fishing**) and dissemination of the compiled information to some organizations (for the future removal) and to general public (raise awareness).

FADS: Fishing aggregating devices

ALDFG: abandoned, lost and discarded fishing gears (nets, pots, ropes, buoys). Europe: 1,000 tn/year.



Citizen Science and Marine Litter Seabeds

H & T



SOS#REDES
ALBORÁN



OCEÁNIDAS



CSIC



Fishermen-
Barcelona Ports Ecoalf



UVIGO-
Vertidos Cero



Ghost Gear Reporter

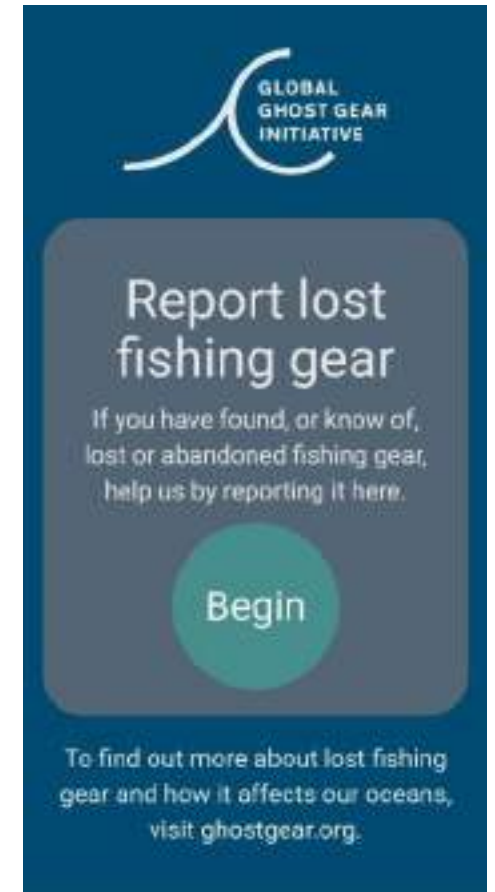


Launch date: 2016 **Author:** Ghost Gear Initiative

Objective: to remove the abandoned and lost fishing gear and to inform about the details and the geoposition of the gear in the coast or in the sea.

Audience: fishing industry, private sector, associations, academy, government and general public.

Potential/data: the app contributes to the **geoposition of the fishing gear in order to facilitate the removing of the gear**. It also helps to **identify hotspots** and to inform about the **impact in the wildlife: ghost fishing**.

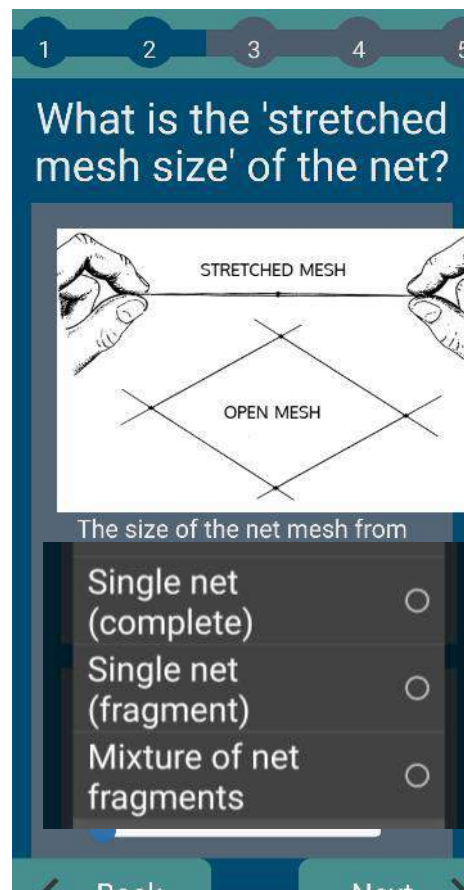


Ghost Gear Reporter : How to use it?

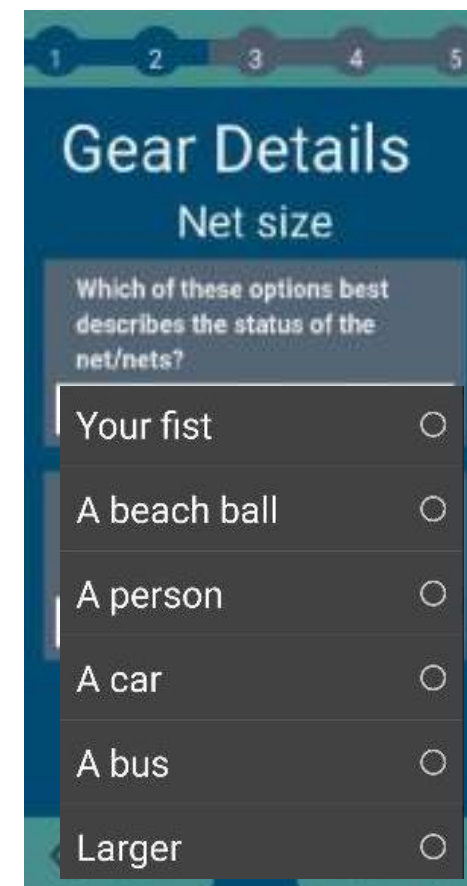
Net:



Select the **area** and select the **gear details**



Mesh size of the net?
Description of the finding



Select the **size net**

Ghost Gear Reporter : How to use it?

Pots

Gear Details
What is the frame material?

METAL WOOD ROPE / MESH

Approximate trap size size (slide to adjust): 0 metres

If the pot or trap has an ID number please enter here

Trap Identifier

Back Next

Type and size of material. (ID)?

Line and hooks

Gear Details
Which best describes the line you are reporting?

Line mixed with other

Please choose
Only fishing line
Mainly hooks or lures
Mixed line & hook
Line mixed with other

Back Next

Describe the finding

Gear Details
Which best describes the FAD you are reporting?

COMMERC HOME MADE

Is the FAD anchored (i.e not drifting)?
No

Is net attached to the FAD?
No

Does the FAD have an ID number?
No

Back Next

anchored nets or drifting nets?
Attached net? ID?

Context
Which best describes your activity when you found the gear?

Please choose

Wildlife & Entanglements
Is any wildlife entangled in the gear?
No

Back Next

Commercial or recreative activity? wildlife? Make a photo and upload it

Citizen Science and Marine Litter

Marine Biota

- Knowledge of the marine litter in the **wildlife**: entanglements or digestion. (Eg. Photos in Social Media).
- Removal of abandoned nets (**ghost fishing**) that still impact over the wildlife.
- **1.000.000 of marine birds and 100.000 marine turtles and mammals** die per year by entanglement or ingestion of marine litter (Greece *et al.*, 2007).
- **15% are threatened species (Red list UICN).**



UNIV. WASHINGTON



SEO/BIRDLIFE/ECOEMBES



Citizen Science and Marine Litter

Marine Biota



Some data:

2018: **22,75 Tn** and 36000 items (P. Libera: campaigning 1m² beaches and sea).

Other outreach activities focused on marine litter



Challenges, recommendations, actions

- **Funding** for citizen science actions
- **Education**, entertainment and learning of **scientific skills**
- **Citizen access to technology** to promote engagement of citizens in science
- **Outreach, raise awareness:** citizen science events, popular events..
- **Metrics and evaluation:** indicators to value actions of citizen science in scientific curricula.
- **Data Policy:** intellectual and personal property rights, quality and data access.

Citizen Science and Marine Litter

GT Experts
CONAMA

*Project in the
“PNMTIAG”.
(FB-MITECO)*





©The WashedAshoreProject

Thanks very much!