

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.



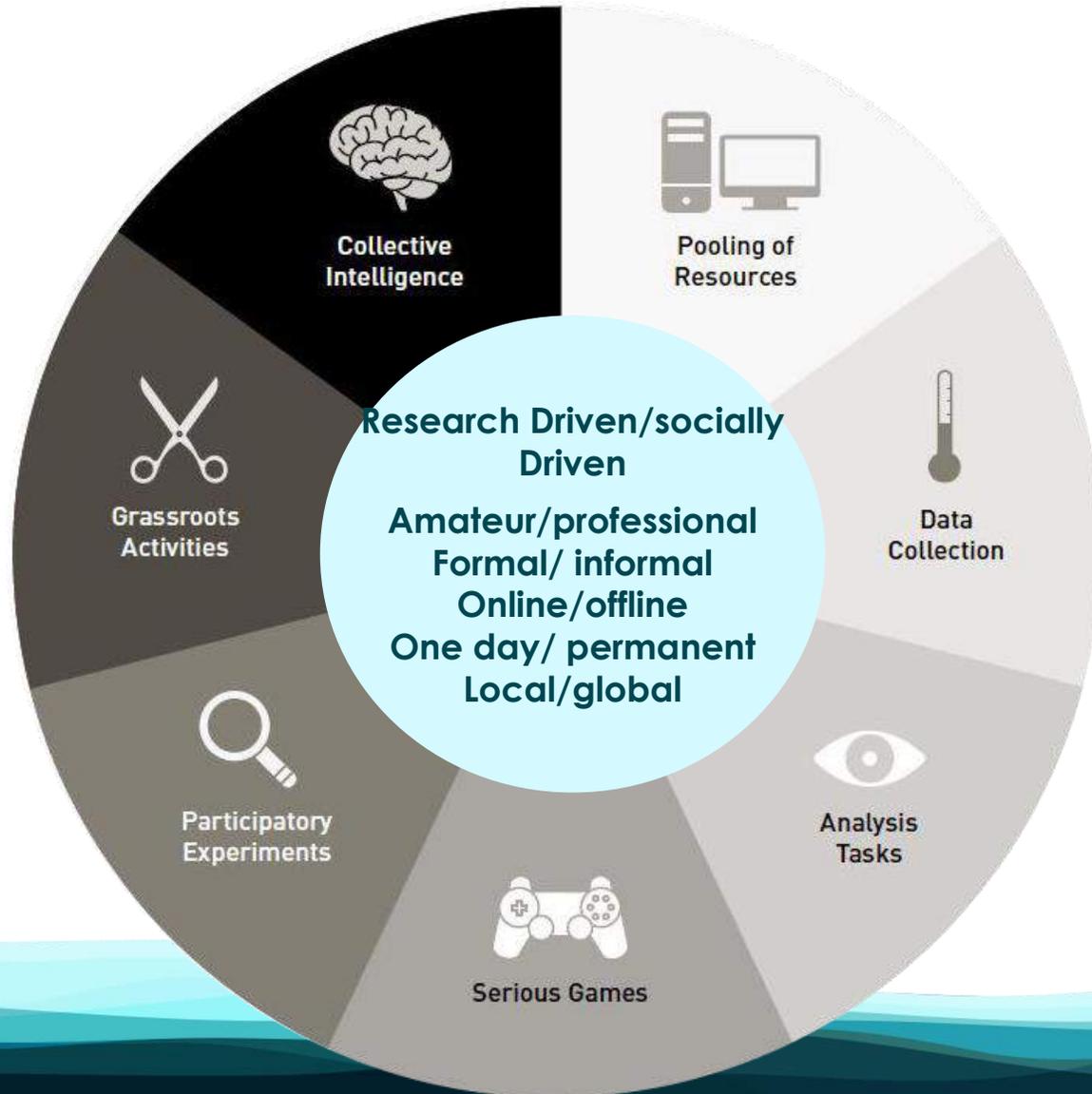
✓ **7th Framework Programme for the research and the innovation H2020.**

✓ **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)



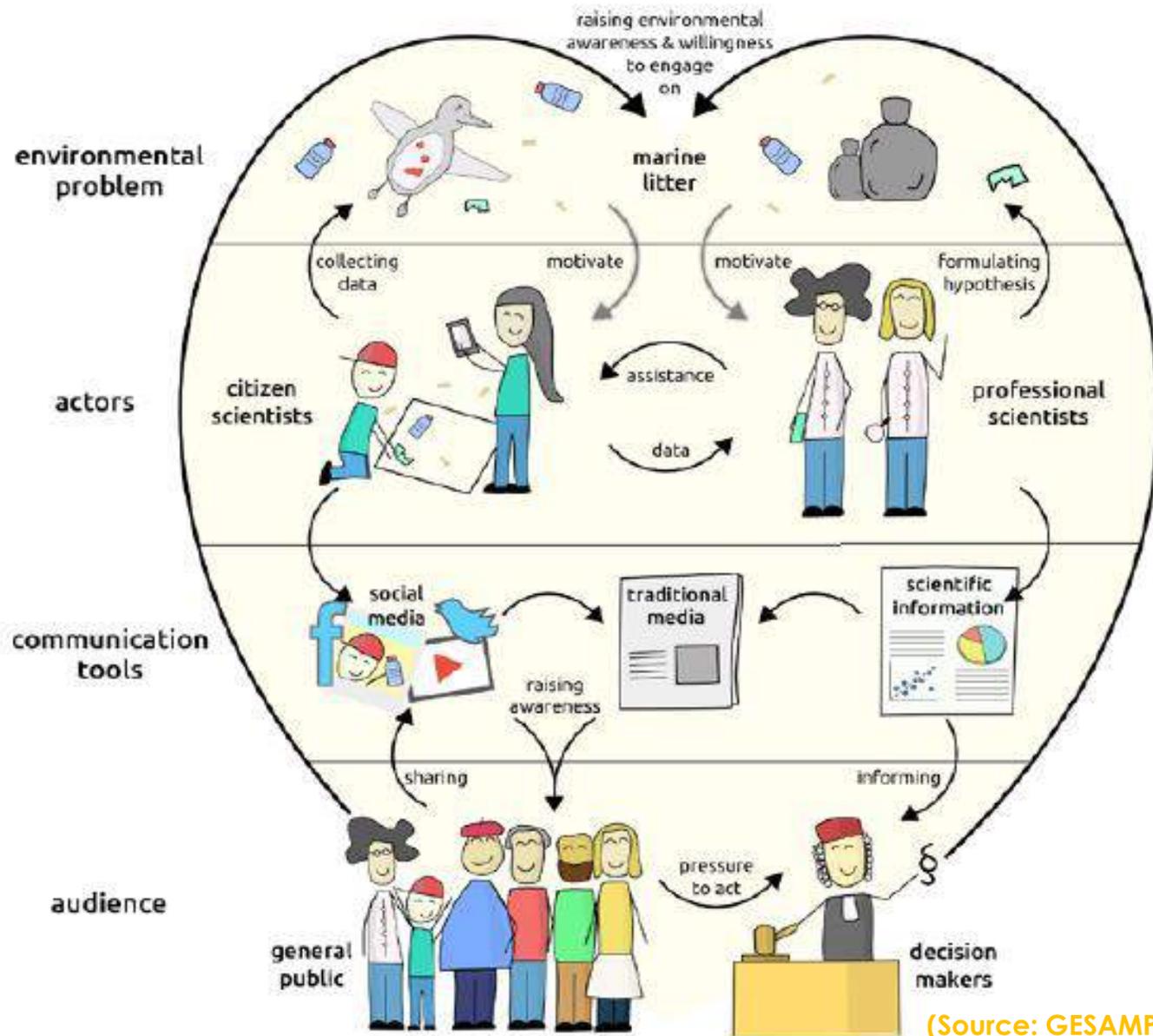
2010: **8 millions Tn** of plastic waste in the ocean (Jambeck et al., 2015).

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)**

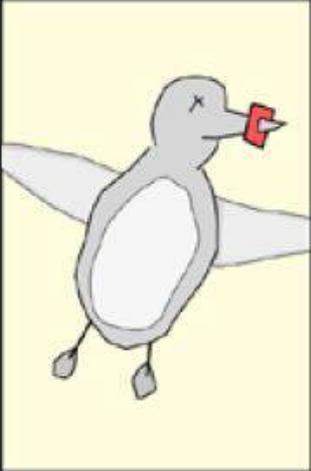
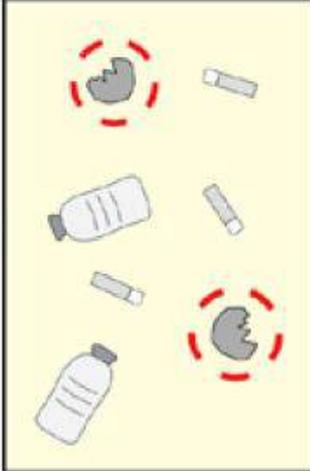
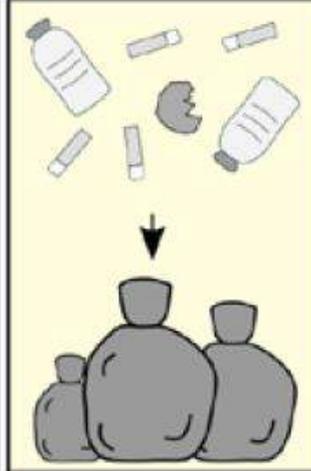
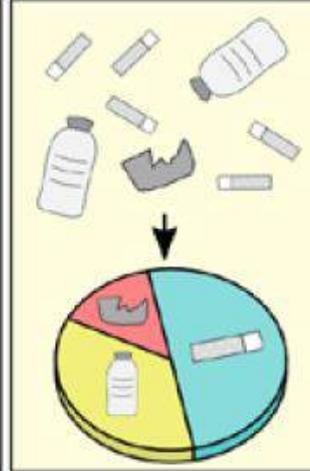
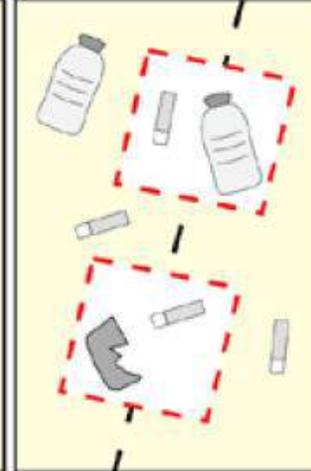




Citizen Science Role

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.

Models of participation

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)

Marine compartments with marinelitter

1. Shoreline



2. Water surface and water column



3. Sea bed



4. Biota



Citizen Science and Marine Litter

Shoreline

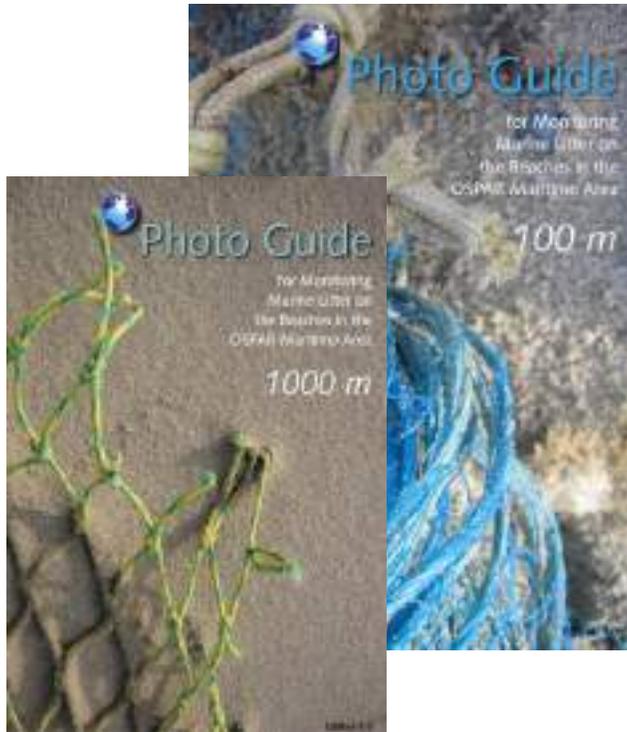
- ✓ Many studies has been conducted on **sandy beaches** because of their **easy access, their attraction for people** and because beaches are places of **marine litter acumulation**.
- ✓ Participation: notification of **accidental findings, specific sampling collection, analyses, publication..**
- ✓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



Plastics • Polystyrene	Rubber	100 metre
<p>28 Ten & party poppers</p> <p>English: Ten & party poppers Dansk/Sjælland: Tændstikker Gallego: xilalaca de festa Inglés: fiesta de cumpleaños Italiano: palloncini Neerlandés: ballon Portugués: balões Sueco: födelsedagskylor Valonés: baloons Zelandés: festa de aniversario</p>	<p>30 Toys</p> <p>English: Toys Dansk/Sjælland: Legetøj Gallego: brinquedos Inglés: toys Italiano: giocattoli Neerlandés: speelgoed Portugués: brinquedos Sueco: leksaker Valonés: brinquedos Zelandés: brinquedos</p>	<p>32 Toys and belts</p> <p>English: Toys and belts Dansk/Sjælland: Legetøj og bælter Gallego: brinquedos e cintos Inglés: toys and belts Italiano: giocattoli e cinture Neerlandés: speelgoed en riemen Portugués: brinquedos e cintos Sueco: leksaker och bälten Valonés: brinquedos e cintos Zelandés: brinquedos e cintos</p>
<p>31 Caps</p> <p>English: Caps Dansk/Sjælland: Dæksluger Gallego: tapas Inglés: caps Italiano: tappeti Neerlandés: deksels Portugués: tampas Sueco: täppor Valonés: tapas Zelandés: tapas</p>	<p>33 Tires and belts</p> <p>English: Tires and belts Dansk/Sjælland: Dæk og bælter Gallego: pneumáticos e cintos Inglés: tires and belts Italiano: pneumatici e cinture Neerlandés: banden en riemen Portugués: pneus e cintos Sueco: däck och bälten Valonés: pneus e cintos Zelandés: pneus e cintos</p>	<p>34 Cloth</p> <p>English: Cloth Dansk/Sjælland: Tøj Gallego: roupa Inglés: cloth Italiano: stoffi Neerlandés: kleding Portugués: roupa Sueco: kläder Valonés: roupa Zelandés: roupa</p>
<p>32 Carboys/bayonet</p> <p>English: Carboys/bayonet Dansk/Sjælland: Sprøjtedybe Gallego: botellas de plástico Inglés: carboys/bayonet Italiano: carichi/bayonet Neerlandés: spuitbus Portugués: garrafões Sueco: sprutorer Valonés: garrafões Zelandés: garrafões</p>	<p>35 River (eg. bottles)</p> <p>English: River (eg. bottles) Dansk/Sjælland: Drikkeflasker Gallego: garrafas Inglés: river (eg. bottles) Italiano: bottiglie Neerlandés: flessen Portugués: garrafas Sueco: flaskor Valonés: garrafas Zelandés: garrafas</p>	<p>36 100 metre</p> <p>English: 100 metre Dansk/Sjælland: 100 meter Gallego: 100 metros Inglés: 100 metre Italiano: 100 metri Neerlandés: 100 meter Portugués: 100 metros Sueco: 100 meter Valonés: 100 metros Zelandés: 100 metros</p>
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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 contribution:
 “additional data”
 4 campaigns/year

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



2014.
 Cantabria
 (Spain)



2017-EU.
 30 communities
 653.320 items
 1407 events

OCEAN INITIATIVES
 www.oceaninitiatives.org
 A PROGRAM DEVELOPED BY SURFRIDER

Main impacts of marine litter

- 1. IMPACT ON MARINE BIODIVERSITY
- 2. PHYSICAL HARM TO MARINE LIFE
- 3. HUMAN HEALTH
- 4. ACCUMULATION AND CONCENTRATION OF TOXIC SUBSTANCES
- 5. TRANSPORT OF INVASIVE SPECIES
- 6. CLIMATE CHANGE



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**.

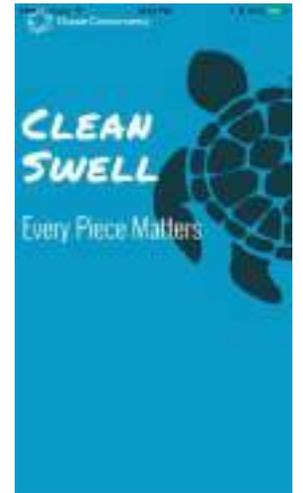
Audience: general public. USA, SE Asia, Malaysia, Thailand and Philipins.

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

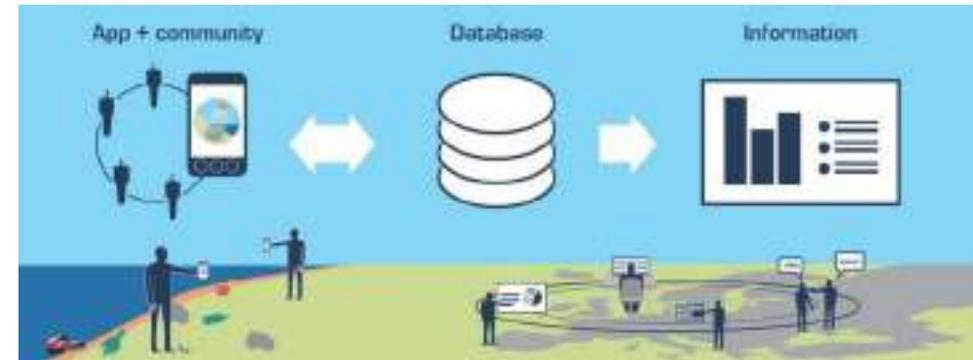


Mobile apps

Launch date: 2014 **Author:** Environmental 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, there is a platform to promote the contact of community, to organize events and to create organized groups for clean ups, etc.

Litterati



Citizen Science and Marine Litter

Mobile apps

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

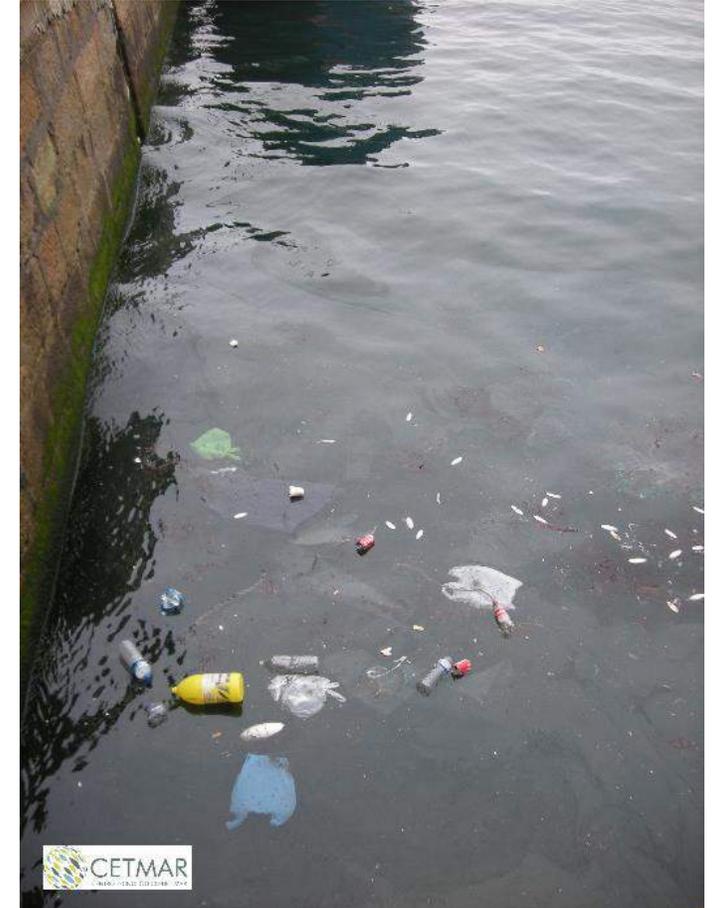
Direct observation of floating macro-litter of the **water surface and water column** during **expeditions** (open ocean) and local surveys (ports, rivers).

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

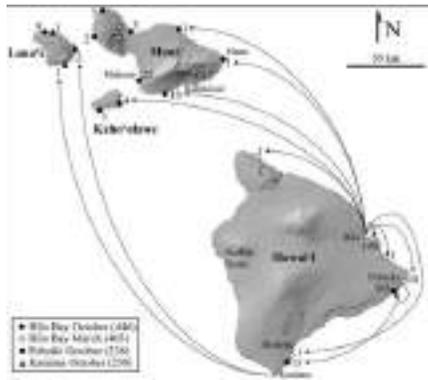
University of Hawaii
Hawai'i Wildlife Fund



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



UVIGO-
Vertidos Cero



Ghost Gear Reporter



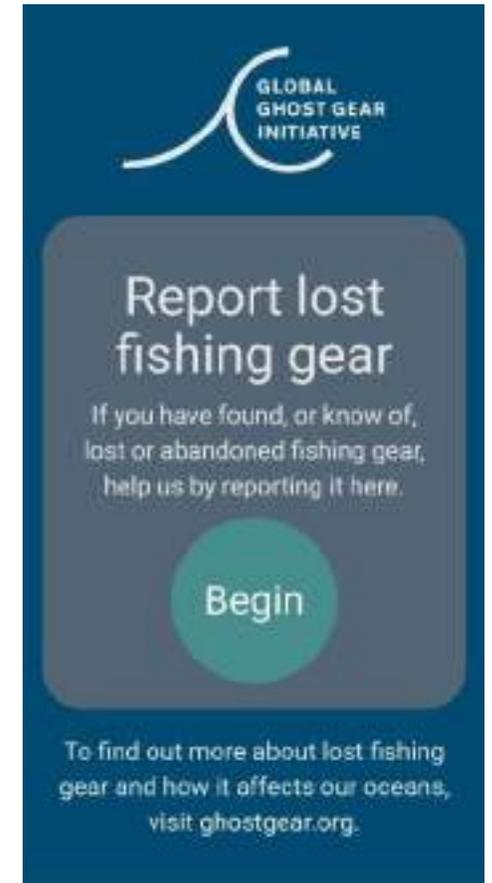
Mobile apps

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**.

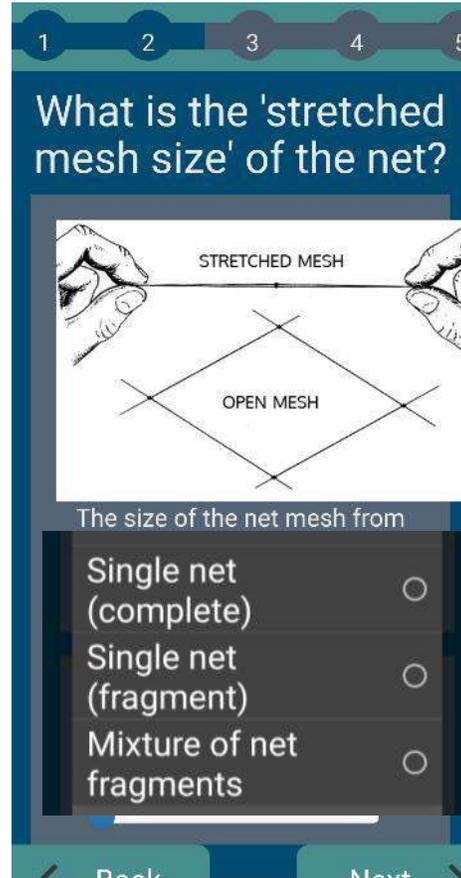


Ghost Gear Reporter : How to use it?

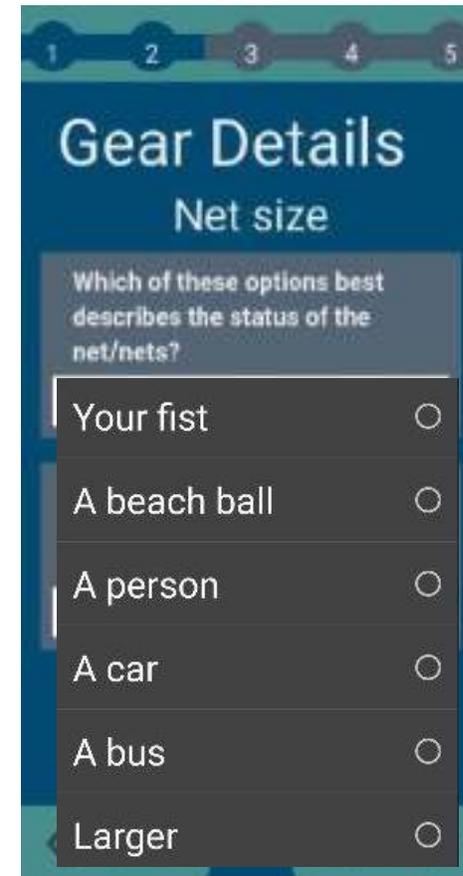
Net:



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



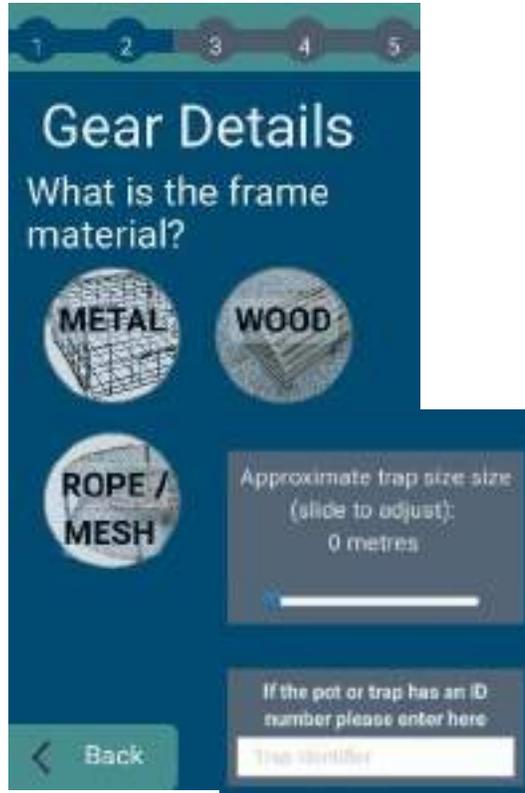
Mesh size of the net?
Description of the finding



Select the **size net**

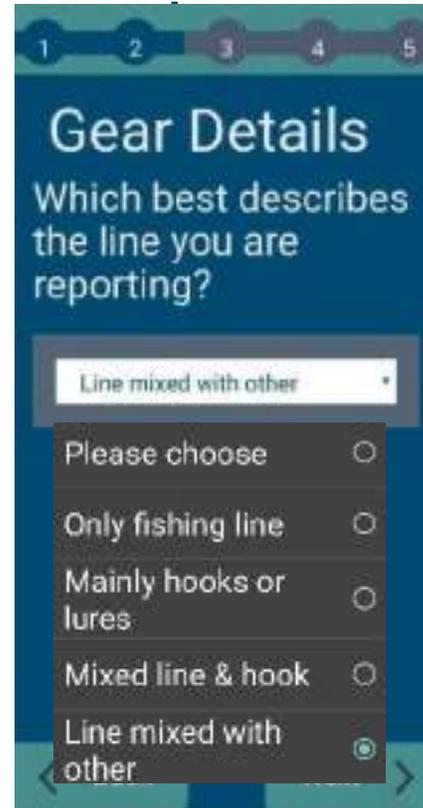
Ghost Gear Reporter : How to use it?

Pots



Type and size of material. (ID)?

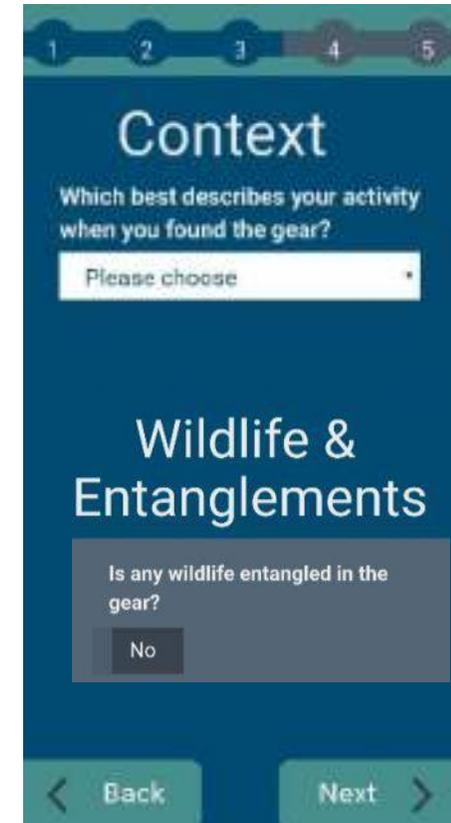
Line and hooks



Describe the finding



Is anchored nets or drifting nets?
Attached net? ID?



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

- 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/ECOEMebes



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.



GT Experts
CONAMA

Project in the
"PNMTIAG".
(FB-MITECO)





©The WashedAshoreProject

Thanks very much!