The Marine Biological Association of the United Kingdom

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Citizen Science: Engaging with change in the marine environment

A workshop held by

The Marine Biological Association

at

The Linnaean Society, London

16th February 2012

Supported by:

UK Environmental Observation Framework

defra
Department for Environment
Food and Rural Affairs

INVESTORS IN PEOPLE

A learned society advancing marine science through research, communication and education

Executive summary

Large amounts of marine life data are gathered by volunteers in the UK each year. At the same time, current, accurate data is needed by scientists and statutory bodies to inform policy decisions.

The need for a meeting to discuss and enhance collaborative working between UK communities and statutory organisations and to develop Citizen Science to monitor change in the environment was identified by a UK-Environmental Observation Framework (UK-EOF) meeting in July 2011. The Marine Biological Association (MBA) proposed a meeting with a focus on the marine environment but with reference to and inclusion of terrestrial programmes for the purpose of learning lessons and identifying any collaborative opportunities.

In February 2012, a workshop was held at the Linnaean Society, London to bring together representatives of these two groups to discuss how the voluntary marine recording data can meet the needs of scientists and policy makers.

The workshop generated detailed discussions on volunteer recording, data needs and more. Clear recommendations arose from the discussions:

1. Greater integration within the marine volunteer recording community should be taken forward.

2. The marine community should look towards cross-sector working with the non-marine community.

3. Regular meetings / workshops should take place to establish and maintain channels of communication between volunteer recorders, volunteer scheme / project managers and policy makers.

The MBA would like to thank UK-EOF for supporting the workshop.

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Citizen Science: Engaging with change in the marine environment

1. Introduction and aim of the workshop

The introductory session provided some background and stated the aim of the workshop:

"to increase communication and co-ordination between the volunteer, science and policy sectors to develop Citizen Science to monitor change in the marine environment."

The workshop built on previous meetings. The Marine Life Information Network (MarLIN) held a conference in 2008 which aimed to "strengthen the relationship between recording schemes and the statutory agencies, thus maximizing the usability of volunteer data". The conclusions of this conference were reviewed and it was considered where things have moved on especially with regard to technology and opportunities for partnership working.

Examples of current Citizen Science initiatives were considered and discussed. Examples included the terrestrial and the extra terrestrial! (Galaxy Zoo). Citizen Science has the capability to engage communities and the technologies to provide valuable data as long as the users of the data recognize the limitations inherent in data collected by volunteers and guide the data collection.
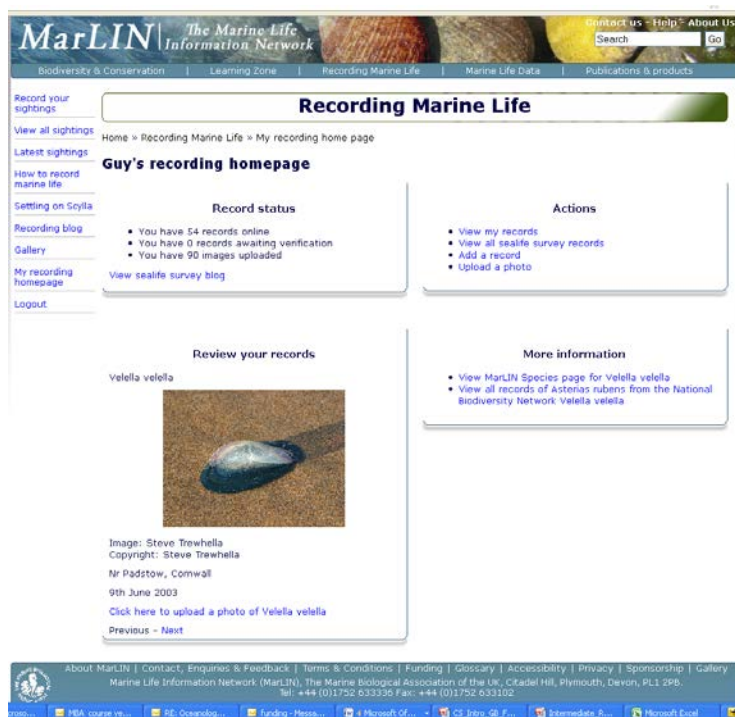

Figure 1. The MBA's Sealife Survey online recording scheme encourages ad hoc records of marine life and links to recording and identification resources.

2. Presentations

Presentations were given by the attendees on the wide range of current citizen science schemes. The presentations outlined volunteer data flow and highlighted some of the key issues, successes and lessons learned. See Appendix 2 for a summary of presentations.

Discussion

The workshop considered some key questions which are discussed below:

i.   Can citizen science support science and policy?

The workshop highlighted a number of successful marine citizen science initiatives that are clearly supporting policy and science. It was however recognized that such projects remain largely uncoordinated and that direct dialogue with policy or science is often limited. Examples that were discussed include:

Invasive non-native species

The GB Non-native Species Information Portal (GBNNSIP) is an example of a structure established as a result of a policy need, and which drives citizen science initiatives.

The imperative to detect and manage biological invasions comes from EU directives (e.g. the Water Framework Directive requirement to maintain 'Good' ecological status of water bodies). GBNNSIP is meeting the directive requirements through an early warning system for arrivals of invasive non-native species (INNS). The early warning system requires strong citizen science input and very fast data flow.

Policy decisions need to be based on solid evidence. With good distribution data, policy makers can weigh up the benefits and costs of management, eradication or interception of INNS. It is therefore imperative that early detection and rapid response mechanisms are in place. It is known that the financial cost of intercepting new arrivals before they become established is far lower than dealing with established invasive species and rapid reporting is key to this.

Two Citizen Science projects were discussed that feed directly into GBNNSIP via Recording Invasive Species Counts (RISC). The Chinese mitten crab and the harlequin ladybird recording schemes both engage communities and use Internet technology to provide rapid real time data. These projects are examples of the power of citizen science directed at a certain species or designed for use by a particular user group.

Figure 2. The web page of the GB Non-native Species Information Portal at:
https://secure.fera.defra.gov.uk/nonnativespecies/factsheet/

The regulators perspective

The Environment Agency (EA) gave an insight into the requirements of an environmental regulator. Regulators are driven by reporting mechanisms and increasingly these are guided by EU Directives that require member states to provide information. The Directives inform the process and the kind of data required is clear and specified.   This means that the scope for marine biodiversity citizen science will be restricted to meet particular needs and the provenance and quality of data and supporting information will need to be strictly controlled.

Despite the need for structured fully directive compliant evidence, there is still value in collecting 'additional supporting evidence' for example from citizen science initiatives, to add to the weight of evidence required to show directive compliance. Additionally, more widescale monitoring projects (for example public recording of green algal mats) can provide information which enables regulators to focus monitoring on priority areas.

Marine litter

The workshop highlighted the work of the Marine Conservation Society's litter survey as a relevant example of citizen science supporting policy. The dataset is clearly unique, and of a nature and scale that the statutory agencies could not achieve. These data are used to report against the Marine Strategy Framework Directive.

Recording to support science

Several speakers spoke about the value of citizen science and public recording in developing scientific knowledge and the potential for this to be taken further. General recording and

citizen science surveys can provide useful information provided sufficient resources and training are provided and that expectations are realistic. Feedback from scientists to participants was felt to be a vital aspect of the process of engagement. The most effective projects had clear scientific questions to answer and protocols and resources carefully targeted towards the selected audience. Particularly successful projects were those where these questions could only be answered by large-scale participation projects.

Recording underwater habitats

Seasearch was considered as an example of an established and well-known volunteer recording scheme which is providing data to inform policy. Detailed seabed data on such a geographic spread would be impossible for statutory agencies to collect, and was clearly of use to the regional MCZ projects. Also, Seasearch was responsive to adapting its protocols to the needs of the statutory agencies. Seasearch data also contributed to the Lyme Bay trawling ban and to consultation responses.

The annual planning meetings between the Countryside Council for Wales (CCW) and Seasearch were described as an example of a statutory body working closely with volunteers. CCW survey requirements are discussed with Seasearch coordinators annually to decide survey priorities and shape the annual program of surveys in Wales.

It was recognized that in general, without specific guidance recreational divers may neglect locations and habitats that are less 'interesting' but which may be of high conservation importance.

Where extensive and long-term datasets already exist, statutory monitoring may develop around them (e.g. BTO data, MCS litter survey and MarClim data). BTO surveys in particular attract huge numbers of volunteers (around 55,000) submitting data to specified standards. It would be ambitious to consider that marine biodiversity recording could attract as many volunteers but whilst considering science and policy needs there may be valuable lessons to be learned from the clarity of purpose of such programmes.

For citizen science to support scientists and policy makers there needs to be communication of policy requirements and understanding of the capabilities and limitations of volunteer recorders on the part of science and policy and adaptability on the part of schemes.

ii.   *Data use, successes and pitfalls*

Data handling and flow was discussed in detail at the workshop.

The generally agreed principles for volunteer data are that data should be:

- verified (records checked for accuracy of species identification) in a robust and transparent way and validated (records checked for correct format, geolocation errors etc.)
- inputted to an agreed database format e.g. Marine Recorder or Indicia

- shared between schemes (requires unique record identifier to avoid duplication)
- made widely available online via the recording scheme and passed to the NBN (as the accepted portal for UK biodiversity records) for display on the NBN Gateway

Progress has been made towards integration of data handling, but new challenges need to be addressed. An issue that was raised several times was the proliferation of marine recording schemes, with small societies and individuals developing their own way of doing things using new media, for example, Facebook. This could pose a threat to maintaining data standards and ensuring accessibility and sharing of records. The volunteer recording community needs to get to these social media users – who may be a particular demographic that doesn't traditionally engage – before they develop new schemes, and offer standardized ways of gathering and disseminating biological records (e.g. Indicia).

At the same time, records being generated through Facebook and Twitter shouldn't be dismissed, as the mass appeal of these social networks is important. Schemes should explore ways of utilizing and mobilizing these records for the greater benefit.

Other points raised included:

- Where does marine data fit within UK biological recording?
- Marine data must ultimately go to the Marine Environmental Data & Information Network (MEDIN), but which entry portal should the volunteer recording community be directed towards?
- The potential for Indicia to be the recommended vehicle for handling records and managing data.
- Issues with interoperability of data are vital to overcome.
- The issue of too many places to submit data can be offputting to the data collector, and the situation seems to be getting more complex.
- Data quality becomes an issue if records are not sent for verification through trusted sites.
- How do we get everyone to submit data to the same place?
- Benefits of databases/portals where data collectors get positive feedback (ability to view their data, get smiley faces etc.). Simple features such as this encourage recorders and ensure maintained interest. It is important the group gets this message out to other organisations.

These topics will be followed up by the groups involved in data management, and the findings will be included in the forthcoming report: Citizen Science Biodiversity Dataflow; a Defra report on current practices and future recommendations.

iii. *Towards a new Citizen Science approach* – bringing together policy and science data needs, and ways of working in partnership to address these needs

The discussion highlighted some conditions that may be required for citizen science to meet the needs of scientists and policy makers:

- citizens should be able to achieve monitoring/data gathering/data processing impossible for statutory agencies (e.g. geographical spread and/or level of detail) due to time and financial constraints however volunteers are not free;
- citizen science initiatives should scrutinize and understand the statutory landscape sufficiently to exploit synergies;
- volunteer recorders will naturally gravitate to species and habitats that are charismatic and / or that require limited effort to survey or in which they have a personal interest; interest in such species and habitats can be encouraged and exploited;
- engagement with policy makers: ongoing, in-depth dialogue is required (GBNNSIP is a useful model) so that scheme organizers understand statutory requirements, and
- schemes should have the flexibility to adapt their protocols but in order to be able to adapt, they need a strong steer from policy makers;
- policy makers should look at the potential for emerging technologies to help non-specialist citizens become recorders.

Greater integration in all areas within the marine volunteer recording community, and improving engagement with policy makers would enable citizen science initiatives to generate the evidence base to feed into and influence policy, in the way that, for example, BTO data does. Projects such as the GBNNSIP and the mitten crab recording project and events such as Bioblitz also illustrate the potential value in joining marine recording with terrestrial and freshwater recording to address policy objectives in a coordinated and efficient way and also to engage new audiences between sectors.

A suggestion was made that Local Record Centres and the Wildlife Trusts have an important role for getting the message out there and broadening the pool of recorders. Although there is concern that the data collected by volunteers remains accessible freely and easily to those who need to use it.

Figure 3. Participants at the workshop at the Linnean Society, London.

Communication and integration amongst marine recording schemes needs to be fostered by leadership from key organizations. For example, the MBA and Biological Records Centre can speak for the community and pull all the elements (data, science and policy needs, publicity etc.) together. This should not be a "top-down" approach; rather the aim should be to ensure that the volunteer recording community is getting what it wants.

The challenge for the community is to show that citizen science is valuable to policy makers, and at the same time to bring disparate groups 'into the fold'.

3. Recommendations

Via this report, the workshop makes a number of recommendations for consideration:
1. Greater integration within the marine volunteer recording community should be taken forward through:
   - clear recommendations and guidance for data for recording schemes.
   - a publicity campaign to attract new recorders and to tackle proliferation of schemes.
   - Better communication and coordination between organizations running schemes to avoid duplication of volunteer effort and focus efforts and resources (including those put into running databases/portals etc) efficiently and effectively.
   - Engaging with the general public at 'crowd sourcing' events to encourage sustained volunteering.
2. The marine community should look towards cross-sector working with the non-marine community

3. Regular meetings / workshops should take place to establish and maintain channels of communication between volunteer recorders, volunteer scheme / project managers and policy makers. Participants in the workshop wanted further meetings that:
   - had fewer talks and a poster or coffee session to go over initiatives in a more informal way;
   - had more representation from the policy side, with examples of the needs/gaps from policy makers which they think volunteers could fill and
   - focused on a subject (e.g. MPAs).

APPENDIX 1. Agenda

Citizen Science Engaging with Change in the Marine Environment - a one day meeting.

Linnaean Society, London 16th February 2012

Agenda

<table>
<tr><td colspan="3" align="center">***ARRIVAL & COFFEE: 10.00 – 10.30***</td></tr>
<tr><td colspan="3">***Session 1:*** Introduction and background</td></tr>
<tr><td>Introduction aims and outcomes of the day</td><td>Jon Parr (MBA)</td><td>10.30-10.45</td></tr>
<tr><td>Citizen Science today – a summary of previous workshops and some current initiatives.</td><td>Guy Baker (MBA)</td><td>10.45-11.00</td></tr>
<tr><td colspan="3">***Session 2:*** Can citizen science support science and policy?</td></tr>
<tr><td>Scientific rationale (good science, good data) – what the scientists need?</td><td>Paul Clark (Natural History Museum)

Juliet Brodie (Natural History Museum/ Phycological Society)</td><td>11.00 - 11.15

11.15– 11.30</td></tr>
<tr><td colspan="3" align="center">***COFFEE: 11.30-11.45***</td></tr>
<tr><td>Policy maker rationale– what the policy maker needs – where to focus effort.</td><td>*Olaf* Booy. (GB *Non-native* Species Secretariat)

Alison Miles (Environment Agency)

Ben Wray (CCW)</td><td>11.45-12.00

12.00-12.15

12.15-12.25</td></tr>
<tr><td>Discussion</td><td></td><td>12.25-12.40</td></tr>
<tr><td colspan="3">***Session 3a:*** Current citizen science initiatives. Data use, successes and pitfalls</td></tr>
<tr><td>The Shore Thing – monitoring climate change on rocky shores

Seasearch – habitat and species mapping by volunteer divers</td><td>Fiona Crouch (MBA)

Chris Wood (Seasearch)</td><td>12.40-12.50

12.50-13.00</td></tr>
</table>

LUNCH: 13.00-13.50		

Session 3b: Current citizen science initiatives. Data use, successes and pitfalls - *Continued*

Bioblitz – public engagement – a snapshot	Jack Sewell (MBA)	13.50-14.00
OPAL & ISPOT – citizen science	Lucy Carter (Natural History Museum/ Opal)/Trudy Russell (i-Spot)	14.00 - 14.15
Large scale public bird surveys	Chris Thaxter (British Trust for Ornithology)	14.15 - 14.25
CEH – non native species surveys	Helen Roy, (Centre for Ecology and Hydrology)	14.25 - 14.35
National Biodiversity Network - citizen science data flow	Paula Lightfoot (National Biodiversity Network)	14.35-14.45

Session 5a: Discussion	14.45 - 15.15

- Data standards

- mechanisms for bringing together both policy and science data needs

COFFEE: 15.15-15.40

Session 5b: Discussion continued	15.40 – 16.00

- Ways of collaborating and working in partnership to address the policy/science requirement

- A new Citizen Science approach. Opportunities, limitations and next steps.

Session 6: Report and next steps	16.00 – 16.30

Close: 16.30

APPENDIX 2. A brief summary of presentations (thanks to Bryony Chapman)

Introduction

Citizen Science today – a summary of previous workshops and some current initiatives. (Guy Baker, MBA)

MarLIN at the MBA ran a workshop in 2008 looking at "Voluntary marine recording in a changing world". It is worth looking at the questions raised and comments made to ensure that we move the debate on and don't go over old ground. Some key points from the 2008 workshop:

Can we be confident in volunteer data quality?

Need to know statutory agencies' expectations – Government scientists need to be educated on data that exists and what is useable.

Is volunteer data suitable for statutory requirements? Statutory agencies felt data mostly not suitable for statutory purposes, but gives context and helps fill gaps, and provides useful contextual information.

Need robust protocols to ensure data is usable.

Channels of communication between statutory agencies and volunteer schemes are essential to enable targeting of survey and synergies between the two groups – e.g. seagrass, INNs.   Need confidence in record, recorder and process

Need to ensure collectors waive intellectual property rights so data can be used. Adequate verification and validation essential

Lots of supporting resources – ID guides specific to regions. Lack of sophisticated tools for collecting data into databases

Summary of the 2008 workshop: Good potential for partnerships – need to KISS, need good comms, and ongoing dialogue between statutory agencies and volunteer collectors.

Citizen Science examples

Data gathering – Shore Thing, Seasearch. likely to have on-line, social media component etc.

Sealife survey – online volunteer recording scheme. 8303 records, over 1000 recorders.

Pooter – phone app - Competitive – take photo of 'bug' (at present only terrestrial and only well-known species.   Has ID help in app – get points for rare, etc.

Old weather records – volunteers transcribe old weather records from ships logs – to see if we can improve understanding of weather from history –massive use - cannot be done automatically, but needs people to decipher handwriting.

Galaxy Zoo - thousands of digital images of sky to classify galaxy types.

Have things moved on since the last conference in 2008?

Seasearch adapted for use in identifying MCZs

Data - Marine Sightings Network. Front end tailored to users' needs, holds data in standard form. Process includes record validation and QC, pooling expertise in identification, Google geolocation. This is flexible, with the level of use depending on the organisation's resources.

Recording Chinese mitten crabs (Paul Clark, Natural History Museum)

History of arrival and recording of Chinese mitten crabs. One really old record, then 1976 in ones and twos until 1990s – sudden small increase, then huge increase in 1994. Mapped all records along Thames from NHM specimens from 1976 on. EA funding to run survey – Chinese mitten crabs hotlines and media coverage to get people involved. >150 records in a few months. Published paper in 1998.

Consortium funded by Esmee – Marine Aliens – group interested in marine aliens in UK. Leaflet produced and Marine Aliens website developed. ID guides produced of invasive non-native (INN) species of most interest, including map of known distribution at the time. Guides help people identify INNS correctly. NHM also had website to take records from members of the public. Becky Seeley at DASSH started mapping Chinese mitten crabs as part of Defra/JNCC MB102 project. Chinese mitten crabs now just south of Oxford – records from public sent in via NHM scheme.

Paul Clark coordinated a group to resource a project aimed at river users to record mitten crabs during their annual migration down river. The MBA produced ID cards and a web site. ID cards include porcelain crabs as people were confusing these with juvenile CMCs. Circulate through Bob Earll's group – 7,420 scientists are recipients. Project resulted in 48 new locations and 90 new records. Record map (visible at http://mittencrabs.org.uk/distribution) shows current distribution all round England including IoW, Cornwall, NE.

Key points to make it work:

Need good press coverage, CMS useful, ID guide important, well designed website easy to find and use . Various means of receiving data – including texts. Funds critical. Publication of results important. Usable results and good policy-making potential.

NHM Big Seaweed Hunt (Juliet Brodie, Natural History Museum/ Phycological Society)

At the moment, seaweeds don't have the appeal of some other species groups.

Case history and issues about quality data etc.

Seasearch ID guide demonstrates the importance of using common names.

Big Seaweed Hunt was launched in 2009 and followed on from IPAs (Important Plant Areas) report, published in 2007.

Capturing the aliens – May 2011. Using herbarium specimens to draw up a list of non-native seaweeds. JB about to publish small article looking at feedback on list of seaweed aliens.

If we want public to get data which can be used in policy, we must be clear about what questions we want to ask.

Big Seaweed Hunt is essentially an outreach project – an algal version of Garden Bird Watch – and part of a big push to raise awareness, and a real need for monitoring. Don't have an amateur following in British Phycological Society, but there is an increasing demand for identification training by public.

Strong scientific rationale behind the outreach. Is it OK to have outreach where you're trying to get data? The question you're hoping to answer is key to whether this is possible.

Having reports of changes in distribution and abundance of seaweeds. E.g. Ascophyllum nodosum lost in Strangford Lough. Ascophyllum nodosum mackii form not widely found. This form was removed by building works at one particular site and never returned. Alaria esculenta is disappearing at some sites in the SW. Other rationale for Big Seaweed Hunt is the increase in INNS – e.g. Caulacanthus, and climate change e.g. finding toothed topshells in winter in intertidal when meant to go subtidal in winter. Need recording schemes to get this sort of information.

Big Seaweed Hunt is funded through British Phycological Society and Opal

Who has taken part? 7,000 website hits. Primary schools 99 returns, and other groups/organisations, including MIND. Survey found to be good exercise for depression sufferers.

Much concentration in SW, but about 100 records spread all round UK.

Quality of Data. Record received with 800 limpets; is it possible to count 800 limpets in a minute? ID problems – confusion between some species.

Various species – appear may be low abundance at popular recreational sites – is human activity having an impact?

Conclusions

Big Seaweed Hunt has raised awareness, and shown potential for more monitoring. Project could inform policy, though hasn't to date. Capturing aliens – good list, good outreach and feedback. JB tried to get Caulerpa onto Schedule 9, but rejected as it's not here yet!

Media profile is important to get public involved.

What are risks of getting too popular – will environmental damage occur at popular sites?

Is survey challenging enough for some people? – can we use some knowledgeable people more?

What's the scope for specific long term monitoring?

How do we ensure quality when mix of outreach and data gathering.

Have we informed policy? Data have been picked up by CCW and MCZ process. Three seaweed species onto WCA act – e.g. Codium, and project has informed BAP process. If can get good RDB list – can inform policy. Think about resources – industry use – food, health, cosmetics – is a big potential issue for future.

Lessons: Need specimens to validate. Need good coverage of site. Need baseline data. Need time to develop. Need verifiable data.

GB Non-native Species Secretariat (Olaf Booy)

NNSS = 2.5 people based in York. Not policy-makers, but help policy makers and help with data provision. Olaf not a marine scientist.

INNS – increasing.   Cost £1.7 billion to UK economy each year. Much of this is crop pests, but still important in marine environment.

Over 2,000 NN species in GB, mostly terrestrial plants. Only 10% invasive.

80 marine NNs, not all invasive.

In the early 2000s, it was unclear who dealt with INNs from policy point of view – some govt bodies dealt with bits, but gaps between (plant, animal, bee health etc.) and Non-native Species Secretariat was set up as a result, with GB Programme Board (Defra, WAG and Scottish Government) and agencies – EN, CCW, SEPA, EA, etc. NNSS helps to co-ordinate and set up groups to tackle problems. Rapid response Working Group.

GB NNS Strategy developed with support from industry and NGOs as well as statutory bodies.

Main thrust – 3 tier approach:

• 	Prevention most important

• 	Early detection and rapid response – lance boil as soon as arrive, but not always successful

• 	Control – when other measures haven't worked.

Policy makers need solid evidence to make policy decisions.   Good distribution data is critical in order to weigh up benefits and costs of eradication. In case of water primrose is worth spending £100K on eradicating from a few sites.

Early detection and rapid response is critical in the balance.

Killer shrimp - alerted by angler – alerted everyone within weeks, and awareness campaign within months to try and help reduce spread – can't try eradication as huge drinking water body is the first area found.

Didemnum vexillum – highly invasive – recently found in Holyhead harbor. Problem for shellfish industry – mussels covered. Holyhead – rapid response – eradication by CCW – managed to wrap all mussel lines etc in plastic but Didemnum vexillum returned. Found

much more widespread in England and Scotland – Hants only shown on map, not updated with Kent records yet.   Early detection and monitoring is critical – getting people engaged and active – help to stop moving things around.

Marine environment very difficult to do anything with INNs. Species identification can be difficult. Have to manage expectations, which is difficult.

Environment Agency Marine evidence advisor (Alison Miles, Environment Agency)

EA not a policy maker, a regulator.

Can citizen science support science and policy?   Initial response is yes, but have to have mutual realistic expectations. People want agencies to follow up on what they're being told. Need people to understand what is monitored and why. Lot of legal compliance that EA is funded to deliver – need to consider what will stand up in court, and what supporting evidence is there. What is driver: shellfish waters? Bathing waters? Push now to take evidence from larger range of sources. Trying to explain what EA is doing and why, e.g. in Undergrad lectures so they're more aware. Important to know how citizen science fits in cycle of Monitor, Assess, Protect, Improve, Enhance.

Pyramid – top is small – very prescriptive, structures, Directive compliant evidence.

Below that larger sections where additional supporting evidence comes in – including more anecdotal evidence – gives weight of evidence to support case – can come from wide range of bodies – from third party data source – but using EA procedures so can be brought into process easily. Largest number of records from screening – e.g. a lot of observations of opportunistic green algae growing on shores. Allows broadscale so can target other resources.

Directives WFD, Charting Progress - took data from large base of sources.

EA evidence requirements for WFD.   Very difficult to establish what Reference Conditions should be – historical records very useful. Directive prescribes what need to look at – it's only limited amount which is monitored. Haven't defined all yet.   Tools calibrated for measurements – what impact you're measuring. Have to be very precise under legislation. Detailed very defined monitoring.   Where obvious which class, just use top level evidence, but if sitting on boundary – other data is useful to help decide which side of line assessment should be.

Have assessed what needs to be done by EA and what others can do.   One end of scale – only EA can deliver, so EA need to put their effort into this most. Where other groups can and are doing data collection – should be using them and EA shouldn't use their resources on that.

Benefits of citizen science: Put people and communities at heart of what EA does. Connect people with environment. Widen people's knowledge of EA's business – people want EA to use their data or take action – frustration.   Tap into new skills, culture, local knowledge and fresh perspectives.

Challenges: Identifying the best opportunities for citizen input.

Considerations: Training, data quality procedures, and HSE protocols. Realistic mutual expectations. Systems to manage the additional data.

Looking forward: UK Marine Monitoring and Assessment Strategy – initiative to gather data. MEDIN – try to get data to be used more. Understanding how EA can support and utilise citizen science. Running pilots – e.g. opportunistic macroalgal monitoring with Essex University – increase understanding of legal requirements for environmental management. Potential to use EA website to promote volunteer networks and pass on records to the right bodies.

Countryside Agency's perspective (Ben Wray, CCW)

MSP role. Case study of Seasearch and how CCW has used this data very successfully.

Seasearch – used in a variety of CCW projects and in MCZ site proposals.

Mostly from Surveyor forms – possible to derive biotope, also habitat and species FOCI habitats.   Also used in BAP process (e.g. fan mussel surveys, seagrass beds) and SAC feature monitoring.

Habitat data – used in HabMap programme and helping wth BGS data.

All data into Marine Recorder.

Strengths – works well for several reasons: Good communications – CCW can suggest sites and features of importance – including areas outside protected sites. Seasearch data helps to fill gaps. Robust training programme – and data is checked by local co-ordinator to verify.

How to make even more useful?   Surveyor forms far more useful than Observer forms – as can assign biotopes. Important to know what you want to get out of the data.   Observer level is more about getting people involved, but can get good Observer forms and bad Surveyor forms.   Monitoring – work needs to be simple – can over task load divers – some can cope, but not all. Data has been used in Skomer – depends on experience of divers.

Session 2: Current citizen science initiatives. Data use, successes and pitfalls

The Shore Thing – monitoring climate change on rocky shores (Fiona Crouch, MBA)

Developed from MarClim – taking historical records – found species distribution was changing as a result of climate change. Project piloted with Dove Marine Lab. and launched in 2006.

Intertidal surveys of rocky shores. Engagement with volunteers and A-level students

Provides presence / absence data for 22 climate change indicators and non natives.

Aims: Give students fulfilling out of classroom experience – involvement in real science.

Increase knowledge of distribution of climate change indicators and INNS.

Raise awareness of marine issues such as climate change, NNS, biodiversity, marine conservation and MCZs.

Not just about data!

UK-based as HLF funded.   118 survey sites around UK.

Methodology – based on that of MarClim

Two types of survey: transect and timed species search. Transect – for schools, a good way of teaching approach and methodology, but data not sufficiently reliable to be disseminated.

Timed species search – for 22 easily identifiable species for 20 minutes.

Resources – flash cards.

Records uploaded by participants onto a MySQL db via project website.

Data validated and verified in MySQL and then entered into Marine Recoder by another person before being submitted to NBN.

Key messages

- Participants enthusiastic involved in 'real' science.
- Training and support from ecologist important – ask for photos to verify.
- Records go through robust verification process.
- Provide feedback – newsletters, websites, etc
- Important to work together. Only a finite number of people who will get involved, so need to not bombard with different projects.

See www.marlin.ac.uk/shore_thing

Seasearch – habitat and species mapping by volunteer divers (Chris Wood)

Habitat and species project carried out by volunteers. Train people, organise dives targeting specific features. Make data available. All done by volunteers – from diving community only – limited citizen group.

Training: 50 courses a year for raw beginners to experts. Produce guides – Bryozoans and Hydroids being done now. Providing information to improve quality of data. Qualification process – includes tests at higher level – worthwhile qualification to have. Surveys: Target gaps in knowledge, and important habitats. In 2012 Seasearch targeting MCZs where insufficient data.   About 2,000 forms each year.   Data into MRec and available through NBN.

Currently over 300K records, 7,301 sites, 2,585 different species (before 2011)

Partnership – MCS led, with other orgs eg WTs organising progs in their area, and stat agencies – and diving associations also involved.   National co-ordinator and local co-ords – gap in Lincs and Somerset only.   Team of tutors to deliver courses.

Data uses: Use by Country agencies – CCW more than others.   SAC programme. Lyme Bay trawling ban. Consultation responses. Environmental NGOs – MCS and WTs mostly for their work. Important contributor to process in England for identifying MCZs – provided data to all RPs.   This was very much aim of Seasearch. Offshore sites – no SS data, but inshore important in identifying species and habitats.   Also used by academics, and NGOs, and by citizens, e.g. COAST.

Successes: involving ordinary divers (500 per year). Increasing amount of data over the years.

Filling gaps in coverage.

Recording : Priority species, eg fireworks anemone, fan mussel, crawfish.   New species – eg anemone prawn. Recording geographic changes

Pitfalls

1 – Quality - All volunteer data has to have good quality control. Solutions: Training programme at 3 levels – tailored to capacity of vols.   ID guides. 2 levels of quality control – local and national. Data entry by experts and biotope assessment.

2 – Attrition - Most people on Observer don't go further. Try to organise dives, Facebook groups, newsletter (eyes still opened even if not doing surveys).

3 – Making recording relevant – not just underwater trainspotting.

Seasearch started making records relevant for MNCR, now it is evolving to meet new demands.

Targeting MCZs in 2012, but struggling to get feedback from agencies as to what they need. Important to volunteers to know how data is to used.   Want to be brought into process.

Bioblitz Public engagement – a snapshot (Jack Sewell, MBA)

Typically, a 24-hour biological survey at a specified location – at any scale from puddle to bay.

First BioBlitz in US in 1996, first in UK 2006, first marine BioBlitz in 2008.

MBA have run several with other partners including Wildlife Trusts.

Benefits:

Raising awareness and public engagement. Networking. Skill development. Collecting useful data. Balance between useful data and awareness.

Useful data to come from bioblitz:

NNS. Under-recorded, or thought to be lost e.g. 13 spot ladybird larva great record from BioBlitz.

BAP.   New arrivals. Species of conservation importance.   Absence information. Inventory for a site for land owners or managers.

BUT:

Some data can be low reliability or low taxonomic resolution – is it still useful? Can be validated or verified. Evidence – expert sign off or photo or specimen evidence.   Significant records can be followed up.

Even if data isn't useful – BioBlitz still raises awareness of why areas are protected and getting public support.   Encourage interest in wildlife, and biological recording. Raise awareness of conservation issues, e.g. NNS. Also gives opportunities for interaction between scientists and public.

Case study of Wembury BioBlitz – good numbers participated.

Future:

Bigger and longer.   Use of internet and social media.   Focus on interest sites – to increase people's interest in sites.   Greater use in surveillance etc.   Biodiversity indicators?

BioBlitz saturation??   Was big news, on TV and sky etc, now more difficult to get coverage.

Questions and comments

BioBlitz could help with long term ecological cyclical understanding.

Danger of damage from too many people. Wembury is already impacted in some areas by public use - rockpool rambles now restricted to a certain area to protect main reef.

Tend to have different groups doing their own survey during the day using their own methods.

Also need to be aware of biosecurity – do people clean their boots afterwards?

Should have a sheet for all these citizen science projects.

OPAL & ISPOT – citizen science (Lucy Carter, Natural History Museum/ Opal)/Trudy Russell (i-Spot)

OPAL (Open Air Laboratory) received big funding!

National surveys – bugs count, hedgerow survey.

Key considerations:

Breadth vs depth – lots of people at low level, or few at higher level. (OPAL is mass audience end of scale, although some more concentrated.) Implications for training, data quality etc.

Balance between data and engagement – 50:50 or 30:70?

Choosing audience is key. OPAL was mass market, but choosing market is easier and more effective so you can target materials more.

Choice of topic or species? How will people come across them?

Do you set an activity, or ad hoc records?

Can they be identified by photos? Are they easy to photograph.

Are there other species it could be confused with?

Can choose suitable species which can be identified by photo.

OPAL observed people doing survey to test likely validity of data. Also verified with samples.

OPAL found it difficult to run surveys on a particular species. They found set activity was better – much easier for a school class etc.

OPAL used a whole range of media – including Bugs count - an app which sends a photo to OPAL immediately it's taken, with location, time etc.

Sending out packs hasn't resulted in much data coming back in.

People don't read the instructions!

Suggest using cartoon etc.

Need to ask why anyone should want to do your survey? Some interesting feedback e.g. pond dipping gives a score to assess health of pond, or lichen – immediate feedback is good.

Need a hook to sell the programme.

iSpot; one project within OPAL (Trudy Russell)

Social networking for identification. Over 16,000 registered users, but 100,000 visitors to the site. Free to register, but have to give e-mail address. 94,000 observations to date. 77% identified to species level from photo and description. 96% have been identified to some level – so very few not identified.   50% identified within an hour of uploading.

iSpot – another national record collecting site – hope it hooks people and prepares them for NBN eventually. Get points for input and correct identifications.   Includes a general surveying knowledge – can join a particular recording group and get a gold star as expert in that group. Top of tree is saying someone is ready to input to NBN.

iSpot was designed as an educational tool rather than for data, but soon decided they needed to use the data to fulfil expectations.

Reliability of data – reputation system with experts agreeing with your ID – give 1 point. Knowledgeable category people can give 0.5 points. User build up reputation when their Ids are agreed. Reputation is passed on with records.

Marine observations. Trudy is one of 10 – she's the only marine expert.

When upload image have to choose a habitat – e.g. coastal or marine

Approx 7,750 have a coastal or marine tag (only 8% of total observations).

Dedicated, but limited number of marine experts.

Not easy to separate from terrestrial observations, so difficult to get help from experts. Help from MBA?

OPAL finishing in November, but website continues for 5 years. iSpot continues.

Large scale public bird surveys (Chris Thaxter, British Trust for Ornithology)

Research scientists –main focus monitoring UK's bird populations. BTO has network of 55,000 volunteers and trained surveyors.

Bird atlas 2007 – 2011.

Birdtrack

Breeding Bird Survey (formerly common bird census).

Garden Birdwatch

Heronries surveys

Nest record scheme. – clutch sizes etc.

Ringing scheme

Waterways breeding bird survey – stretches of waterways

Wetland bird survey – WeBS

Components of successful online wildlife recording:

User friendly

Unique feedback to volunteers

Planned and publicised research/use of the data.

Appropriate data sharing

Record validation system

Partnership

BTO garden birdwatch – very popular, with 5.8 million weekly submissions – 74 million observations – also mammals, Lepidoptera, herps and bees.

Use of data: linking decline in greenfinch records to a disease; population trends; distribution shifts show up.

Monitoring seabirds – BTO has done some – mostly JNCC though.

Seawatching – volunteers record seabirds passing headlands.

Bird track – online data capture. Can see seasonal patterns and changes over time.

CEH – non native species surveys (Helen Roy, Centre for Ecology and Hydrology)

Biological Record Centre in CEH still going on today, having been set up prior to NBN days.

About 2,000 established NNSs.

Cast study - Harlequin ladybird first record in 2004. Online survey (possibly first). Had to submit photo to verify record. Amazed by response which was huge. Lots of publicity, including stands in London Zoo. Exhibits, school summer fayres, speakers' corner.

Tried twitter – only tweet about ladybirds and has 550 followers, and now getting more records through twitter.

Harlequins have spread 100km/year. Can assess impact on native ladybirds in square once Harlequin arrives.

One online recording page – native records are increased as a result of recording non-natives through organisational websites.

Important to feed back to recorders. Finite resource of keen volunteers – have a duty to use them to the best effect.

National Biodiversity Network - citizen science data flow (Paula Lightfoot, National Biodiversity Network)

NBN has been going about 10 years now – mainly species records, but more recently habitat data.

What do we mean by citizen science data?

Volunteers

Structured rather than ad hoc

> Data answer a question

> Awareness can be greater than data e.g. GBW – millions of species records

Citizen science data

High volume (potentially)

Species habitats and environmental data

Often digitised at source by recorders themselves

Great variation in expertise of recorders

Sometimes long term repeated observations (UK EOF interested in these)

Assume freely publicly available – (should state)

What tools and systems are available?

Online data capture (not all use this)

Online verification

Online ID guides and keys

Feedback for recorders

Secure data storage

Database of species linked to habitats, environmental data, sites – in same database, or interoperable with others

Dissemination of data to scientists.

Dissemination to other data users in the UK and overseas.

Suggest we have all the tools required to do this, but need to link better.