Citizen science and nature volunteering in the Netherlands: Threats and opportunities in a changing field.

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Citizen science and nature volunteering in the Netherlands has a huge social and economic value. It supports nature conservation policies, saves governmental institution money, can be used as an educational tool and has been reported to increase mental and physical well-being among volunteers. However, due to social and cultural changes, the nature of volunteering is changing. The motives to start volunteering increasingly stem from personal interest and the type of activities offered rather then a sense of service ethic and responsibility towards a community. To adapt to these changes, it is important for organizations to know individual motivations and the time volunteers have available in their volunteer work. Two of the most common motivations include “contributing to nature conservation” and “learning more about nature”. A clear communication is needed when citizen science results in policy change and scientist can use the drive of volunteers to learn to abide by increasing requirements of scientific outreach and education. Moreover, it becomes increasingly important to match the needs of volunteer to the tasks available by scientist and organizations to keep current volunteers on board and to attract new young volunteers. To achieve this, cooperation and communication between organizations regarding their activities becomes ever more important. A sense of shared responsibility towards the collective pool of volunteers and seeing it as a resource that should be managed properly could help in this regard.

Introduction

Biodiversity is declining worldwide. With 40% of species listed on the red list and 77% of habitat target species in an unsustainable state, the Netherlands is no exception (Sanders *et al.* 2019). Over the last two decades the decline in high quality natural areas has not been halted (Compendium voor de Leefomgeving 2020). Here the quality of a natural area is defined by the relative number of certain target species present in a habitat. When 75% of the target species are present in a natural area it gets the high quality classification. It is therefore important to correctly asses the number and distribution of species to define the quality of a natural area. Monitoring programs and scientific research are indispensable in this regard. The monitoring programs rely for a large part on the effort of dedicated volunteers and scientific research increasingly makes use of citizens for data collection. These volunteers and citizens can collectively be called citizen scientists: members of the

general public undertaking scientific work, often in collaboration with or under the direction of professional scientists and scientific institutions (Oxford English Dictionary 2014).

The Netherlands has a rich tradition in nature volunteer work. It is estimated that citizen science with 15.000 voluntary observers is responsible for 90 – 95% of species data used by the Netwerk Ecologische Monitornig (NEM) (Breman *et al.* 2017; CBS 2019). This has several major benefits. First, the NEM is responsible for reporting species data to the EU as part of the international agreement to stop the decline of biodiversity in Europe, highlighting the importance of citizen science at an international level. Domestically, this data is used to substantiate nature policy and their evaluation as well as the creation of nature protection policies. Second, it is estimated that obtaining the same data that citizen science projects generate would drastically increase if these projects would be executed by professionals rather than volunteers (Breman *et al.* 2017). A cost-benefit analyses by Breman *et al.* (2017) showed that the Constant Effort Site (CES) project of the Vogeltrekstation cost 175.000 euro over a five year period but would increase 8-10 fold if it were to be executed by professionals. Third, citizen science has shown to be an educational tool for volunteers to learn more about nature and in turn have an increased sense of earth stewardship (Brossard *et al.* 2005; Bonney *et al.* 2009b; Jordan *et al.* 2011; Worthington *et al.* 2012; Domroese & Johnson 2017). Some limited evidence also suggests that volunteers have an increased understanding of the scientific process after being involved in a citizen science project if that project is designed with that particular goal in mind (Bonney *et al.* 2016). Finally, an improved physical and emotional well-being is reported as an immediate response among volunteers participating in nature volunteer work (Bonney *et al.* 2016; Kragh *et al.* 2016).

It is safe to say that citizen science in the Netherlands is an extremely valuable and should be cherished and possibly stimulated. It can be seen as a shared resource where responsible management will prevent unsustainable use and thereby depletion (Brudney & Meijs 2009). However, as a result of social and cultural change the nature of citizen science, and thereby the responsible management, is changing (Lorentzen & Hustinx 2007; Hustinx 2010). In recent decades, a decline in “traditional” volunteering has been observed where the willingness to start volunteering increasingly stems from personal interests rather than service ethic and a responsibility towards the community (Hustinx & Lammertyn 2003). The

focus of value-based motives with long lasting loyalty to organizations is shifting towards an more pragmatical approach, focussed on services and activities offered. Moreover, volunteers increasingly demand flexibility towards their time spent volunteering, the type of activity they preform and their commitment to an organization. To adjust to these changes it becomes increasingly important for organizations to realize what motivates volunteers to participate in citizen science and to match these motivations to the tasks organizations have to offer. Finally, with a relative high age of 61.8 the number of people involved in nature volunteer work could be problematic in the future (Ganzevoort & van den Born 2020).

This essay will give a brief history of citizen science and the recent rise in interest in citizen science. Two common motivations for Dutch nature volunteers are highlighted and suggestions are mentioned how to anticipate to these motivations. A framework is created which visualizes the different citizen science projects according to the level of participation. This framework could make it easier to link the needs and motivations of volunteers to the tasks offered by organizations and scientists. Finally the relative high age of nature volunteer workers is addressed to ensure the continuity of the valuable system of citizen science in the Netherlands.

The rise of citizen science

Citizen science has its roots in the very beginning of modern science itself. Charles Darwin was an unpaid companion to Captain Robert FritzRoy during his journey on the Beagle, not a professional naturalist. In fact, science as a paid profession only started in the 19th century and continued to develop in the 20th century (Mamlok-Naaman *et al.* 2011). However, with developments in human welfare the characteristics of citizen science have changed. It is no longer an activity for a privileged few but rather an activity for people with an interest in science, available to all (Silvertown 2009). One of the first “modern” citizen science projects started in 1900 and is still ongoing today. This is the Christmas Bird Count, organized by the National Audubon Society, started with 25 counting locations in the United States and has grown continuously with 20-30 locations added each year. Locations in southern Canada and Latin America are being added as well (Dunn *et al.* 2005). The data obtained by the Christmas Bird Count is used in a wide range of scientific publications including geographic patterns of bird distributions (Bock *et al.* 1978), bird life changes over time in distribution

and abundance (Brennan & Morrison 1991; Root & Weckstein 1994), broad scale population irruptions (Smith & Scarlett 1987) and hypothesis driven questions regarding causes and patterns of population change (Smith & Scarlett, 1987; Dunn et al., 2005). In the Netherlands, the national "Tuinvogeltelling" (Garden Bird Count), organized by Sovon, is held annually in January. In 2020, 90.264 volunteers counted 1.581.156 birds making it the biggest citizen science project in the Netherlands (tuinvogeltelling.nl, 2020). In 1973, Sovon also organizes the "Atlasproject" with the goal of creating distribution maps of bird species. Volunteering birdwatchers recorded the presence of bird species in 5 x 5 km grid blocks. This has resulted in the first bird atlas of the Netherlands (Teixeira 1979). Since then three more atlases have been published and, besides occurrence, the density of bird species has also been recorded (Sovon 1987; Sovon Vogelonderzoek Nederland 2002, 2018). With the last atlas being sold 20.000 times it can be concluded that this citizen science project has been incredibly successful, becoming a valuable tradition (sovon.nl). Many more projects have occurred or are still ongoing, most of them over the past two decades. This relative recent rise in the use of citizen science can be attributed to three factors according to Silvertown (2009).

First, technological tools have developed to be easily accessible on electronic and mobile devices (Sullivan *et al.* 2009). Most notably the internet has allowed for quick communication between field observations and (online) databases. Moreover, it allows for easy communication between scientists and volunteers thereby reducing time and costs in recruiting, training and evaluation. The development of applications for mobile devices and also play a significant role in streamlining the flow of information. With a vast majority of the people in the Netherlands owning a smart phone it has become easy to distribute online data forms. Online data forms have the advantage of ensuring that all essential information is provided by preventing participants from saving data where not all required fields are filled in (Bonney *et al.* 2009b). Moreover, records that do not fit within existing scientific knowledge can be flagged for further review by an expert before it is saved in the database. Second, professional scientists increasingly realize the potential of citizen science in conducting research on a large spatial scale with simultaneous observations (Bhattacharjee 2005). In one example, scientists were able to track the spread of conjunctivitis in house finches (*Haemorhous mexicanus*) across the United States using 24.864 data forms filled in

by volunteers of Project FeederWatch (Dhondt *et al.* 1998). More recently a European wide study tested evolutionary changes in shell albedo for brown-lipped banded snail (*Cepaea nemoralis*) (Silvertown *et al.* 2011). The project, titled Evolution MegaLab, was available for 15 different European countries in 14 different languages and obtained 7.629 data records by 2.472 registered volunteers (Worthington *et al.* 2012). Studies like these provide unique datasets and would not have been possible without citizen science.
Third, research funders increasingly impose conditions for grants where public outreach is a requirement (Silvertown 2009). It's is in the interest of researchers that the public appreciates the value of scientific research as many research grants are funded using taxpayers' money. Probably the best way to increase appreciation and understanding of science by the public is for them to partake in it.

Motivations for nature volunteers

To investigate the motivations and experiences of Dutch nature volunteers Ganzevoort & van den Born (2020) performed a survey among 3775 participants. They found "contributing to nature conservation", "being connected to nature", "spending time outdoors" and "learning more about nature" to be the top motivational drivers for citizens to participate in nature volunteer work (**Fig. 1**). Here the two motivations "contributing to nature conservation" and "learning more about nature" will be discussed.

"Contributing to nature conservation" was ranked the highest motivational driver according to Ganzevoort & van den Born (2020). In this regard, clear communication between volunteers and organizations or institutions is very important so volunteers understand how their volunteer work contributes to nature conservation. This is sometimes not done well enough. When policy makers use data obtained through citizen science, the volunteers responsible for this data need to be informed. There is a role here for governmental institutions to clearly communicate with volunteer organizations and volunteers themselves regarding policy implementation. Important to mention here is that information regarding policy should be linked to the local environment of the volunteer (Calabrese Barton 2012). By producing not only national trends but also regional trends, volunteers can more easily track changes in their own environment which makes it easier to connect their own observations to national trends. Moreover, more transparency is needed to clarify how

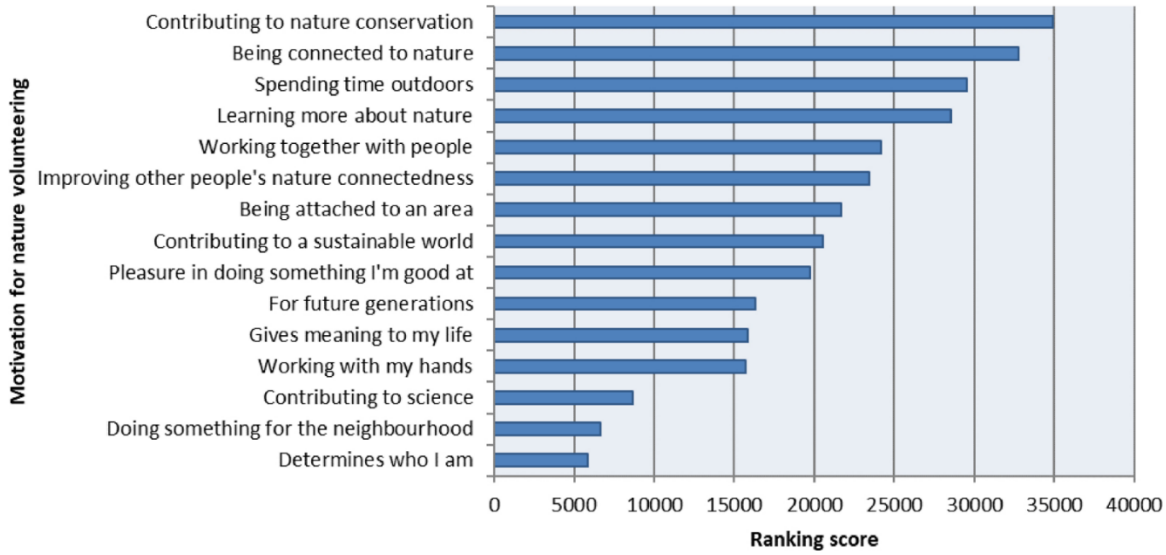

Figure 1. *Motivations for Dutch nature volunteering. Ranking calculated by attributing scores to each item based on a respondent's ranking (e.g. 15 points for first rank, 1 point for 15e rank, 0 points if left out) and then summating these scores across all respondents. Taken from Ganzevoort & van den Born (2020).*

volunteer data is used, where it is stored and how it results in scientific publications. This is in fact one of the ten principles of citizen science formulated by the European Citizen Science Association (ECSA 2015). To achieve this, more investment in data management is needed. At the moment data is sometimes documented poorly and details about data quality processes are lacking which makes it hard to use the data or inappropriate assumptions are made (McKinley *et al.* 2017). Moreover, information on how to cite the available data is sometimes missing which makes acknowledging and thanking volunteers sometimes difficult for scientists (McKinley *et al.* 2017). This is really important as the majority of the volunteers feel they, or the organization that keeps track of their observations, should be thanked when their observations are used (**Fig. 2**).

"Learning more about nature" is a motivation that consistently ranks high for nature volunteers (Ganzevoort & van den Born 2016, 2020; Admiraal *et al.* 2017). During a questionnaire performed by Ganzevoort & van den Born (2016), "learning more about nature" was ranked second highest after "being connected to nature". When asked how they kept their species knowledge and their respective distribution up to date, a vast majority (88,4%) answered that they did this themselves with the use of field guides, books or through online search. However, the contact with other observers (48,6%), contact with experts (38,3%) and participation of excursions or field courses (34,5%) were also important

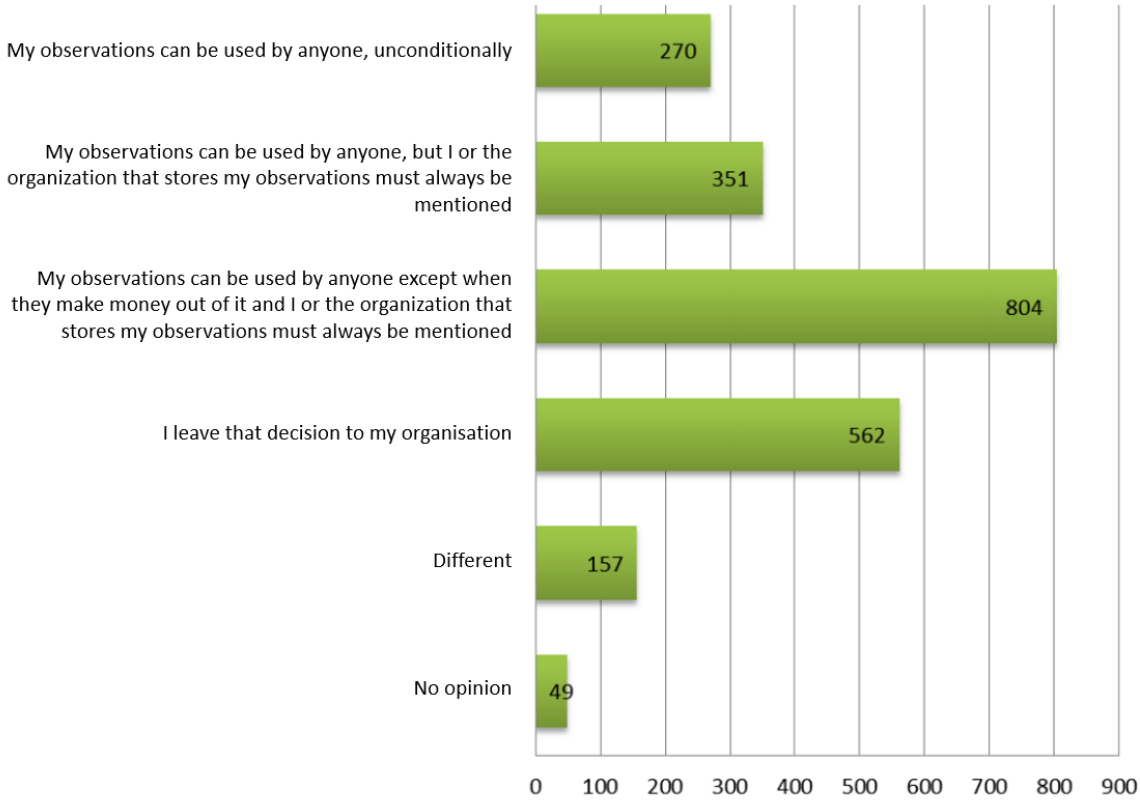

Figure 2. *Conditions of data use for Dutch nature observers. Results after a questionnaire by Ganzevoort & van den Born (2016).*

ways to gather knowledge. This goes to show that educational outreach of scientists to volunteers is highly valued. This is a big opportunity as more research funders require project related science outreach to be an integral part of the project if it is to receive the grant (Silvertown 2009). As part of the Horizon 2020 EU Research and Innovation programme the European Commission formulated that: “Horizon 2020 requires an increasingly transdisciplinary and multi-stakeholder approach, involving citizens and end-users, the public sector, and industry, so as to link and take advantage of unique perspectives and knowledge.” (European Commission 2016). Moreover, “Exploring and supporting citizen science” is listed as one of five strategic orientations of the Horizon programme on top of the public engagement and science education already required by every strategic orientation. Several citizen science projects already showed that participation leads to an increased knowledge level of volunteers regarding the projects subject (Bonney *et al.* 2009b; Dickinson *et al.* 2012). However, it is unclear if educational outreach by citizen science projects is enough to satisfy the hunger of volunteers to learn. More research is needed on how volunteers would like to gain knowledge and if the educational elements of citizen science projects are sufficient.

Levels of participation

As aforementioned, volunteers increasingly decide what volunteer work suits them based on their personal skills and the activities offered by organizations. Moreover, present day volunteering increasingly appears to occur on a sporadic, temporary, non-committal bases (Hustinx & Lammertyn 2003). The amount of time citizens want to spend on volunteer work differs between individuals. On the other hand there is a wide variety of citizen science projects regarding the amount of time and effort participants need to invest. Some projects require little effort from volunteers while for other projects volunteers are periodically schooled to keep their knowledge up to date. For example, volunteers of the Vogeltrekstation, an organization that rings birds, are required to follow an extensive training program if they want to ring birds on an individual basis and are required to keep their knowledge up to date by applying for a ring certificate each year (vogeltrekstation.nl). Other projects, like the annual "Tuinvogeltelling" (Garden Bird Count), only require basic species recognition skills to participate. The matching of time available for volunteers to the requirements of citizen science projects becomes increasingly important. Due to the large differences in time and effort required by different citizen science projects it helps to divide them into different participatory levels. This way it becomes insightful how to match the needs of volunteers to the activities offered in citizen science projects. In this essay the classification of Haklay (2013) is used where four participatory levels in citizen science projects are defined (**Fig. 3**). It largely overlaps with the three classifications established by Bonney *et al.* (2009a) but, it adds a fourth category (crowdsourcing) since advancements in technology has made this category applicable to ecology as well. The four different levels will be explained starting at the lowest level of participation and ending at the highest level of participation.

The first level is called "crowdsourcing". It requires minimal cognitive engagement and is limited by the sensory equipment of the volunteer. Due to technological advancements every citizen is able to carry a GPS and image recognition software on their smartphone. This insures data quality as long as the characteristics of the sensory equipment (e.g. the accuracy of a GPS receiver) are known (Haklay 2013). In the Netherlands, OBSIdentify is a free app which uses image recognition software to determine the species on a photo and

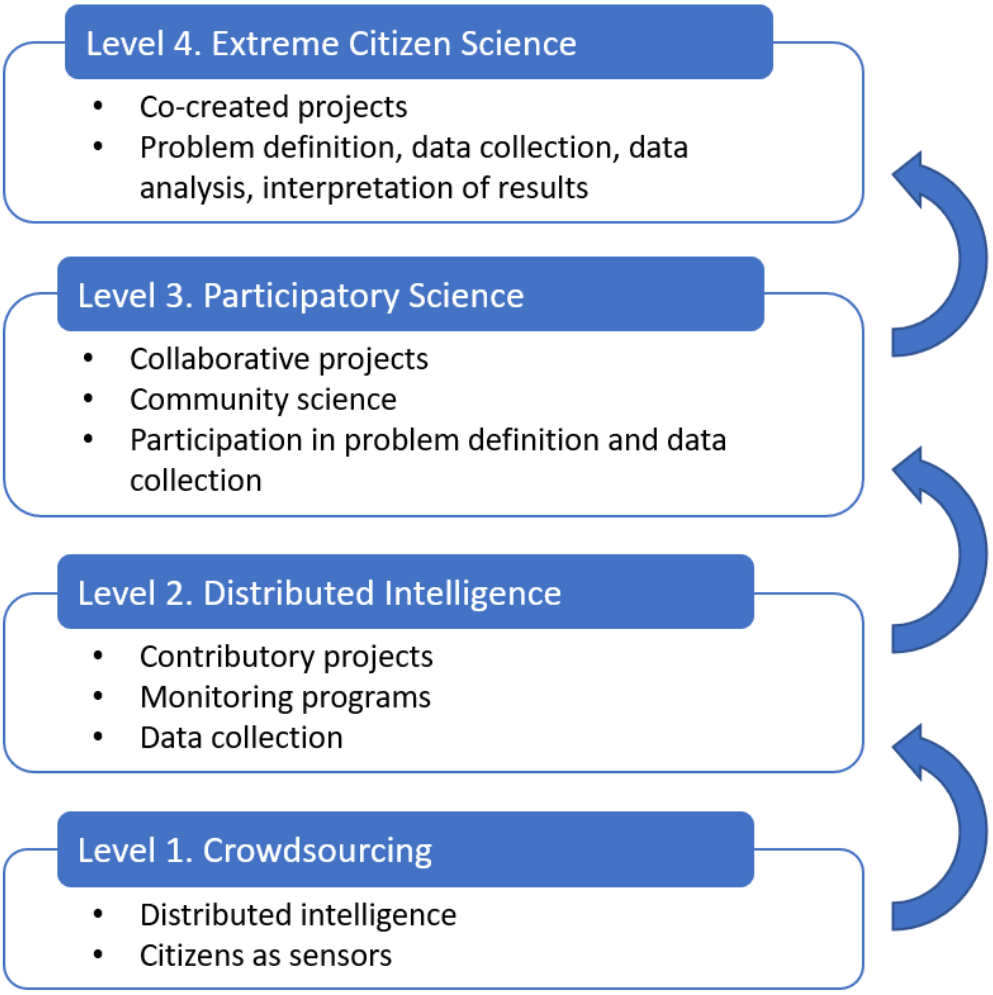

Figure 3. *Levels of participation in citizen science as defined by Haklay (2013). Adapted to include the classification described by Bonney et al. (2009a). Blue arrows indicate the flow of volunteers as they are recruited by or matched to a project with a higher participatory level.*

sends it to the waarneming.nl database. If the GPS is turned on, the photos are geotagged as well making it possible to determine were the photo was taken. Moreover, the time and date of when the photo was taken is stored as well. This allows for a anyone with a smartphone to contribute to the database even without species recognition skills and because there is no requirement for scientists to interact with volunteers the number of participant is virtually limitless. On the other hand, the most valuable asset of the volunteers goes to waste: their cognitive ability.

The second level is called “Distributed Intelligence”. At this level the cognitive ability of volunteers is the resource being used as for example in monitoring programs and annual count activities, like the Tuinvogeltelling, where volunteers need to have some level of

species recognition skills. This does not mean that people without species recognition skills cannot participate. In the Evolution MegaLab project for example volunteers where required to complete an online quiz to help them recognize the difference between two *Cepaea* species (Worthington *et al.* 2012). Distributed intelligence is quite well established in the Netherlands with 15.000 volunteers participating in species monitoring (CBS 2019). Their volunteer is coordinated by special species organizations where each organization is responsible of the monitoring of one species group (**Table 1**). Standardized protocols are used which are developed in coordination with the Central Bureau of Statistics in the Netherlands responsible for data analyses. The results are then reported back to the species organizations and published by governmental institutions. This system creates a streamlined flow of information of species numbers and distributions only made possible by the work of volunteers. Other projects include more hypothesis driven scientific work like the aforementioned Evolution MegaLab. This project aimed to answer evolutionary questions regarding shell polymorphism in banded snails *Cepaea nemoralis* and *Cepaea hortensis* at a European level (Silvertown *et al.* 2011). Participants were asked to determine snail morphs and the habitat in which they were found following a scoring scheme. 2.472 European participants, of which 381 were Dutch, submitted 7.629 records resulting in the biggest European citizen science project ever undertaken.

The third level is called "Participatory science". At this level volunteers participate in or are responsible for defining the scope of the research. They collaborate with professional scientists in formulating research questions, defining hypothesis and are engaged in data collection. It is also possible that volunteers come up with own research questions themselves but require assistance

Table 1. *Species organizations in the Netherlands responsible for species monitoring. They cooperate in the Netwerk Ecologische Monitoring (NEM) to provide species numbers, trends and distributions for governmental institutions and the public. A combined 15.000 volunteering observers participate in the species organizations (CBS*

Species organization	Target taxa
Anemoon	Marine organisms & Mollusks
BLWG	Lichens
De Vlinderstichting	Butterflies & Dragonflies
EIS	Insects
FLORON	Plants
NMV	Mushrooms
RAVON	Reptiles, Amphibians and Fish
Sovon	Birds
Zoogdiervereniging	Mammals

in methodology or analyses by professional researchers. This is sometimes called “community science” as well. It is common in environmental justice cases and follows Irwin's (1995) philosophy that science should follow the needs of citizens (Haklay 2013). One example is the effort of citizens' initiative “Meten = Weten”. Here worried citizens of the rural municipality of Westerveld collected soil samples, water samples and samples of their vegetable garden to investigate for the presence of agricultural insecticides (Meten=Weten 2019). The samples were then analysed by Eurofins Lab Zeeuws-Vlaanderen who found 57 different pesticides in 12 samples. According to their website they now work together with professional scientists from different universities in the Netherlands to further investigate this matter (metenweten.com).

The fourth level is called “Extreme Citizen Science”. Here volunteers are completely integrated in the research. They are responsible for the decision making on what the research should focus on. Moreover, they contribute to the formulation of the research question, the methodology of the data collection, data analysis and interpretation of the results. The role of professional scientists in Extreme Citizen Science is to facilitate and advise in the research as an expert. However, the distinction between volunteer and professional scientist at this level is not always clear cut. Some professional scientists are also volunteers in their free time which would classify them as citizen scientist in that regard as well (Breman *et al.* 2017). The NESTKAST (NEtwerk voor STudies aan nestKASTbroeders, Network for studies to nest box breeders) project is a partnership between different bird monitoring organizations in the Netherlands to study nest box breeders (Ballering 2020). It allows for volunteers to gather clutch information of birds during the breeding season. They adhere to a protocol formulated by Fergusson-Lees *et al.* (2011) to ensure data quality and volunteers have the option to choose either a less intense monitoring technique or a more detailed one. This way, volunteers can choose how much time they want to spend on nest monitoring. Volunteers are also involved and partially responsible for data processing, analyses and reporting their findings. Since 1995, a breeding box report is published every year for a diverse range of birds written by the volunteers themselves. Another great example is Project CIRP (Cumulative Human Impact on biRd Populations) which tries to investigate how human influence effects population trends of the Eurasian Oystercatcher to halt their decline (chirpscholekster.nl). Within this project volunteers can also start their own

subproject to analyse and to publish their own data. This has resulted in numerous publication over the last two years (Allen *et al.* 2019b, a; Linssen *et al.* 2019; van der Kolk *et al.* 2019, 2020). Worth mentioning here is that these articles are published in open access journals ensuring that all volunteers have access to the publications they have helped realizing.

Citizen science projects are not limited to a single level of participation in the presented classification, as for example some volunteers in a project are involved in defining the scope of the research (Participatory Science) while other volunteers contribute to the project by only collecting data (Distributed Intelligence). The different participatory levels can be seen as a ladder, where Crowdsourcing only requires basic knowledge and volunteers can often contribute to the project in their own time with little effort while Extreme Citizen Science is the most comprehensive and requires volunteers to put in more effort while having higher knowledge levels and more time available (Hecker *et al.* 2018). Important to note here is that the amount of available volunteers drops if you scale up the ladder due to time constraints and increased knowledge requirements (Haklay 2013). It is therefore important to know the knowledge level of volunteers and how much time they have available to help them decide which level of participation best matches their needs. This framework can support that matchmaking.

Attracting new (young) volunteers

In the Netherlands, there are increasing concerns regarding volunteer numbers in the future. These concerns include an aging population, a lack of participant diversity and a lagging organizational support (Ganzevoort & van den Born 2020). With an average age of 61.8 and almost half (47.9%) exceeding the age of 65 it can indeed be concluded that nature volunteers in the Netherlands are of a relative high age (Ganzevoort & van den Born 2020). One explanation can be found in the amount of free time older age groups experience compared to younger age groups. Nevertheless, a new campaigns have launched to tackle the concerns mentioned above, among which the high average age (Actieplan Groene Vrijwilligers 2018). One focus point of this campaign is to create an interest for nature among the youth. For example, a green traineeship for people aged 16-30 has launched to guide people in nature volunteer work while simultaneously harnessing their knowledge

regarding nature and nature volunteer work (groenevrijwilliger.nl). While this seems a promising way to attract new (young) people in nature volunteer work it is only applied at a provincial level. The hub groenevrijwillger.nl, which the green traineeship is part of, has been developed by the province of Noord Holland. It tries to connect the supply of nature volunteer work and nature educational programs with the demand of citizens, creating a centralized network for citizen to fiend what they are looking for in regard to nature volunteer work. So far only the province of Noord Brandt has joined this project but it's potential could be increased if more provinces would join a single centralized hub where citizens can search for citizen science projects based on their location, type of activity, time requirement by the project. This could make project recruitment easier and could allow for better communication and alignment between projects to limit the competition for volunteers. Another way to promote nature volunteer work among children is through the use of game-like elements in projects. This is called gamification; "A process of enhancing a service with affordances for gameful experiences in order to support users' overall value creation and invoke behavioural outcomes" (Huotari & Hamari 2012). While the current use of gamification is limited in ecology, it's potential to connect children with nature is an opportunity that needs further investigation. The BioBlitz projects can be seen as a form of gamification. Here participants try to find as many species as possible within 24 hours, resulting in a localised snapshot of the biodiversity (Lundmark 2003). The BioBlitz is gaining popularity as new technology makes it easier to identify species. Recently the Jaarrond Tuintelling project organized a BioBlitz commemorating their 5 year anniversary on the 20th of June 2020 (tuintelling.nl). This form of crowdsourcing could spark interest in nature volunteer work potentially resulting in citizens who would like to contribute more to nature volunteer work.

Crowdsourcing thus could create a pool of potential volunteers for projects in a higher participatory level. This way, the participatory model can also be seen as a recruitment ladder. Projects with a high participatory level can tap in the pool of volunteers at a lower participatory level if the need for additional recruitment arises (**Fig. 3**). This is especially true if a projects is operating within different participatory levels. Important here is to avoid competition between different projects as volunteers who want to spend more time on volunteer work could move away from their current project, leaving a gap. Moreover, most

volunteers contribute in different organizations as the nature of the activities is often more relevant for volunteers then ties to a specific organization (Hustinx 2010; Actieplan Groene Vrijwilligers 2018; Ganzevoort & van den Born 2020). It is therefore vital that different organizations and projects coordinate activities and create a shared responsibility for managing all volunteers across traditional organization boundaries to ensure a healthy, motivated pool of volunteers (Brudney & Meijs 2009).

Conclusion

The Netherlands has a long tradition in citizen science and has become an integral part of biodiversity monitoring. With nine species organizations and many other citizen science initiatives operating at different participation levels, many volunteers contribute to Dutch nature management. However, due to social and cultural changes the focus of value-based motives with long lasting loyalty to organizations is shifting towards an more pragmatical approach, focussed on services and activities offered. It becomes increasingly important to know what volunteers are looking for in their volunteer work and to match these needs to the tasks organizations and scientists have to offer. Two of the largest motivational drivers are “contributing to nature conservation” and “learning more about nature”. A clear communication is needed when volunteer data is used by a third party as well as policy changes resulting from citizen science. With science outreach increasingly being demanded by research funders and a large number of volunteers wanting to learn more about nature, there is a win-win opportunity for all parties involved. If educational outreach becomes in integral part of a citizen science project volunteers are able learn more about nature in a hands on manner while researchers can tap into a huge “free labour” pool. Moreover, governmental institutions have a cheap way to gather nature information to abide to international and national law. An aging volunteer pool could be a worrying sign for the continuity of citizen science projects in the future. It is therefore important to attract new (young) volunteers and to keep current volunteers motivated in their work. As volunteers increasingly make volunteering decisions based on the activities offered rather than their ties to an organization, the coordination and collaboration between organizations becomes more important. Looking at volunteerism as a collective natural resource that needs to be managed properly to prevent unsustainable use and thereby depletion can help in this regard.

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