Geographic citizen science for forest monitoring and conservation

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Published in:
Policy Briefs (Copenhagen Centre for Development Research)

Publication date:
2020

Document version
Publisher's PDF, also known as Version of record

UNIVERSITY OF COPENHAGEN
DEPARTMENT OF FOOD AND RESOURCE ECONOMICS

POLICY BRIEFS • COPENHAGEN CENTRE FOR DEVELOPMENT RESEARCH
NO. 02 • AUGUST 2020

Plough machines transporting illegal timber, in the province of Kratie, February 2019

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Introduction

Community involvement is a well-established practice within environmental conservation projects across the globe. Whilst it takes on various forms, enabling members of a community to collect and report data is generally acknowledged as a cost-effective and sustainable way of promoting conservation efforts. Also called citizen science, the approach often uses sophisticated but accessible IT technology to gather large amounts of data, while simultaneously increasing communities' sense of responsibility and ownership (Irwin, 2018).

However, successful implementation of citizen science requires a favourable and conducive social, institutional and economic context. Without this, communities involved face serious barriers, as well as risks to their safety and livelihoods (Celati and Coletti, 2019; Geoghegan et al, 2016). These barriers include the lack of recognition by authorities of community members' rights to conserve the forest, lack of donor funding, tension and violence in the face of conflicting interests of resource users and exploiters (i.e. loggers, companies, community members), and corruption. This brief focuses on illegal logging in Cambodia, which, despite widespread local and international

efforts, is leading to serious loss of valuable forests, its resources and the rich biodiversity it supports. Specifically, the case of the Prey Lang Community Network (PLCN) is presented, which is a loosely structured network of local and indigenous villagers in Cambodia who use an advanced smartphone application to collect data on deforestation. Members of the PLCN patrol the forest in order to stop illegal loggers and to collect data on illegal logging, biodiversity, climate change, as well as noting encounters with and reporting to authorities. The dedication and perseverance of this ongoing initiative has given the community in Prey Lang international prominence as leaders in community-led citizen science for conservation (Kinver, 2016; Chakrya, 2019).

However, PLCN also faces challenges to their work due to the social, institutional and economic context in which they operate. These barriers threaten the sustainability of the initiative, as well as the wider effort of protecting Cambodia's precious forests. The aim of this brief is to highlight the effectiveness and achievements of PLCN, while presenting those factors that inhibit reaching the full potential of applying citizen science in a local conservation context. Ending with a number of policy recommendations, the brief targets donors, government and environmental monitoring bodies, whose actions could contribute to the removal of these barriers.

Background

The Prey Lang Community Network[1]

Cambodia is part of the Indo-Burma biodiversity hotspot (Mittermeier et al. 1999). Its forests are home to hundreds of rare and endemic species of plants and animals (Hayes et al., 2015). Cambodia also has one of the highest rates of deforestation in the world (Milne, 2015), despite having Asia's most extensive protected area management system on paper, with 50 protected areas covering more than 75,000 km2 (Open Development Cambodia, 2016).

After the suspension of the national logging concession system in 2001, which mostly operated outside protected areas (Anon, 2004), the Cambodian government started granting economic land concessions inside protected areas.

[1] This section is a modified excerpt of Brofeldt, S, et al. 2018. Community-Based Monitoring of Tropical Forest Crimes and Forest Resources Using Information and Communication Technology – Experiences from Prey Lang, Cambodia. Citizen Science: Theory and Practice, 3(2): 4, pp. 1–14, DOI: https://doi.org/10.5334/cstp.129

Photo: Rich biodiversity in Prey Lang's forests

As of 2012, a total of 113 such concessions had been granted inside Cambodia's protected forests (ADHOC, 2012; HRC, 2012). Remote sensing of the forests by US MODIS/FIRMS suggests that deforestation rates are as high inside Cambodia's protected areas as they are outside (Peter and Pheap, 2015).

The focus of this brief is a forest area named Prey Lang and a monitoring program implemented by a partnership consisting of the Prey Lang Community Network (PLCN), the University of Copenhagen (UCPH), the Danish CSO Danmission, a local IT company Web Essentials and the local NGOs Peace Bridges Organisation (PBO) and Cambodian Youth Network (CYN). Prey Lang is the largest lowland evergreen forest complex in the Indo-Burma biodiversity hotspot (Hayes et al. 2015). The forest covers about 520,000 ha and supports more than 200,000 people, including Kuy indigenous communities as well as Khmers. The forest forms an integral part of the local culture, and most people in the area directly or indirectly derive their livelihood from it by collecting resin, building materials, medicine, and food (Jiao et al., 2015; Hayer et al., 2015).

The PLCN was formed by local village groups in the 2000s to document logging activities associated with economic land concessions granted in the forest in the years 2002 to 2007, but that frequently operate illegally and outside their designated areas. Since 2009, the PLCN has been working voluntarily and independently to protect Prey Lang, by undertaking forest patrols to intercept these illegal loggers and to seize chainsaws and other logging equipment.

The PLCN has advocated for Prey Lang's protection since 2004, calling on the government to acknowledge PLCN and the local communities in Prey Lang as partners in the future management of the forest. The primary objective of the monitoring program is to support this advocacy effort by documenting logging activities as well as the important biodiversity in Prey Lang.

In 2016, following pressure from PLCN and other grass-roots organisations, as well as a wide range of national and international institutions, Prey Lang was included in the national protected area network. Despite this, the area remains the focus of large-scale conversion to agriculture and plantations, and the forest itself continues to be the target of logging of high value timber species. Several violent conflicts have occurred as villagers are forcefully removed from their ancestral lands, sometimes by the military (Global Witness 2009).

The Prey Lang App

The monitoring technology used by the community is a geographic citizen science application that runs on smartphones, developed through a collaboration between an international NGO[2], the University of Copenhagen, PLCN, a local IT company and two local NGOs[3],. With the application, forest monitors are able to document various aspects of the forest during their patrols and contribute to painting a more comprehensive picture on deforestation in Prey Lang.

These aspects include evidence of illegal logging, such as planks left for later collection, stumps, cleared areas, or coming across logging happening real-time. Furthermore, the app allows patrollers to collect data on forest resources, including luxury tree species, NTFPs, and animals, which is valuable data for measuring the (loss of) biodiversity of the forest. A third function enables recording interactions with authorities, while with the latest upgrades to the app forest monitors can also record evidence of climate change, and mitigation and adaptation measures.

Records include reference data (time, date, GPS coordinates, phone ID), primary documentation (photo and optional audio recording) and thematic tags (Resources, Illegal Activities, Reporting, Climate Change, as well as various subcategories) (Brofeldt et al, 2018).

[2] Danmission
[3] Peacebridges Organisation (PBO) and the Community Peace-Building Network (CPN)

Photo: Screenshots of the application

After patrols, these data points are uploaded to an online database, where they are cleaned and validated by database managers in order to remove incomplete, irrelevant and duplicate entries. Once the database is finalised, the data is analysed and results are reported in regular Monitoring Reports, which are published on-line and presented to the Cambodian administration and relevant authorities.

Outcomes and Challenges

Results

The application was rolled out in 2015 and since then, it has had a remarkably high interaction rate, both in terms of community involvement in citizen science, as well as wider conservation efforts. Between 2015 and 2019, over 23,000 entries have been submitted by patrollers and of these nearly 50 percent were validated according to a quality assurance protocol. Almost 90 instances of illegal logging activities were reported each month. Moreover, large amounts of information about biodiversity, encounters with authorities and signs of climate change have been recorded.

Acquiring quality data of this magnitude would most likely be impossible without the involvement of community members, pointing to the efficiency and necessity of applying citizen-science methods. An analysis by Theilade et al. (2020) concluded that there is no significant difference in the proportion of validated entries in terms of gender or age. The implementation of the project also turned out to be significantly more cost-effective than conventional data collection methods, such as the use of professional foresters.

Photo: Large areas cleared from logging activities

The Cambodian public now has access to information on the status of Prey Lang. Publishing and distributing the Monitoring Reports has contributed to wider international awareness on the risks the forest is facing and pressures the Cambodian government to initiate periodic crackdowns on smuggling and illegal operations (Chakrya, 2019).

The future of PLCN and challenges

The use of the Prey Lang app has been expanded beyond the borders of the Prey Lang Forest. As of 2018, the application is also used in the Prey Preah Rokar Wildlife Sanctuary, a protected forest in north-east Cambodia. In Prey Lang new technologies, such as GPS tracking, drones and trail cameras are showing the potentials of expanding community monitoring to map the organised and illegal timber trade in Cambodia, including exports to its neighbouring countries and, eventually, to consumers across the globe.

However, there are also a number of institutional and practical challenges preventing reaching the full potential of ICT technologies used by PLCN members, for the protection of their forests. The primary barrier is the systematic shrinking of civil space and crack down on civil society, opposition and independent media by the Cambodian government.

One manifestation of this is a 2017 regulation requiring forest patrollers to seek a permit and forewarn the Ministry of Environment prior to conducting a forest patrol. Prey Lang community members conducted various forewarned and non-forewarned patrols and found more illegal logging operations in the latter scenario, suggesting that there is a high likelihood that loggers are tipped off by corrupt government officials (Theilade et al., 2020). Furthermore, PLCN repeatedly faces more open exhibitions of top-down restrictions, such as the recent blocking of participants to attend an annual tree blessing ceremony; or the arrest of key anti-logging activists and patrollers under allegations of trespassing private property and their subsequent ban from investigating deforestation (Savi, 2020; Vicheika, 2020). The combination of this ban and the more recent limited movement in the face of the covid-19 pandemic has led to reports of even larger scale illegal deforestation in the forest (Narin, 2020).

Patrollers also face personal risks in their pursuit of forest conservation, with reports of threats, violence and even severe injuries resulting from the clash of interests between loggers and patrollers. While a recently added function to the application allows patrollers to record such threats and instances of abuse, and has seen some reduction in cases, these threats continue to endanger the safety of patrollers.

Finally, while PLCN has been able to achieve extraordinary results with relatively small input and an often-disadvantageous enabling environment, the Prey Lang App and the smartphones used needs continuous maintenance. Uncertainty about the financial sustainability of the initiative is a major barrier to further expanding the monitoring and subsequent push to conserving Cambodia's rich forests.

Policy Recommendations

Governments should recognise the approach of geographic citizen science for monitoring of forest crimes. The cost of development and implementation is significantly less than monitoring by professional rangers, and its complexity did not affect the ability of community patrollers to use the tool, regardless of age or gender.

Donors should increase funding of projects using this approach. Data collection using a geographic citizen science application facilitated use of results in advocacy, on social media, and to petition relevant authorities in the government. Furthermore, ownership of the data collection is critical to the empowerment of communities involved and increases feelings of responsibility and the quality of the data produced.

Environmental monitoring bodies responsible for monitoring the legality of natural resource uses and conservation should encourage and use such data. It is cost-effective, reliable, leads to action on the ground and empowers civil society, and is therefore highly valuable for environmental protection across the tropics and for global conservation and climate change mitigation.

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Design: Kent Pørksen
Layout: Malene Jensen-Juul

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ISSN 2246-6800
Title: Policy briefs (Copenhagen Centre for Research and Development) (Online)