Dimitris Argyriou,
Søren Brofeldt, Ida Theilade

COMMUNITY-BASED MONITORING (CBM) IN PRACTICE:

Digital Tools, Local Agency, and Environmental Governance Across Five Countries.

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EXECUTIVE SUMMARY

Around the world, environmental governance is strained by accelerating biodiversity loss, climate impacts, and declining public trust. As the "CBM in practice" report notes, "community-based monitoring engages citizens directly by incorporating their knowledge, observations and perspectives into natural resource management and climate action."

Danmission's global CBM programme builds on the premise: that **communities are not only the first to witness environmental change, but also essential actors in shaping the decisions that determine the future of their ecosystems.**

This report shows how CBM initiatives supported by Danmission in Cambodia, Myanmar, Lebanon, Tanzania and Kenya contribute to more inclusive, accountable and evidence driven environmental governance. It explores how communities generate credible data, how this data strengthens their agency, and how it can influence policy processes from the village level to international frameworks such as the Kunming–Montreal Global Biodiversity Framework (KMGBF) and IUCN Resolution 126.

Aim of the Report

The aim is twofold: first, to understand how community-generated data and digital monitoring tools are reshaping governance relationships; and second, to identify what is needed to scale and institutionalise CBM so that community evidence becomes a routine and valued component of environmental decision making.

The report analyses **how communities use digital tools, how CBM strengthens empowerment and organisation, how evidence is used in advocacy and media, and what lessons emerge across countries**. It also assesses **how Danmission's work aligns with global expectations** that countries must "support community-based monitoring and information systems" under the GBF.

COUNTRY EXPERIENCES

Five Pathways Toward Community Evidence Systems

Across the five countries, CBM takes different forms but shares a common logic: communities define what matters, generate evidence, and use it to claim space in governance.

In **Cambodia**, the Prey Lang Community Network and other forestry networks demonstrated the transformative potential of community-generated data through the Prey Lang app.. Communities produced georeferenced evidence that gained national and international recognition, and as the report notes, "*georeferenced photographic evidence replaced anecdotal reports, strengthening credibility with authorities and media.*" Yet Cambodia also illustrates the fragility of civic space: **despite strong data, political constraints have increasingly limited the influence of monitoring and exposed environmental defenders to risk**.

CAMBODIA

In **Lebanon**, the Green Rangers initiative shows how CBM can function even where state capacity is weak. Citizens report violations through an app and hotline, TERRE Liban validates cases, and evidence is channelled directly to enforcement authorities. Women and youth play central roles, and the model demonstrates that community evidence can lead to real enforcement outcomes—though **long term impact depends on stronger penalties, institutional commitment and sustained support**.

LEBANON

In **Myanmar**, the KERBWA app emerged from a deeply participatory design process in the Salween Peace Park. Communities, Indigenous authorities and KESAN codesigned the monitoring system, ensuring that it reflects Karen knowledge, priorities and governance structures. Despite conflict conditions, **communities established a data governance model that protects Indigenous data sovereignty and positions them as custodians of their forest landscapes**.

MYANMAR

THEMATIC SYNTHESIS:

What the Evidence Shows

Across all contexts, several themes emerge that are crucial for understanding the potential—and the limitations—of CBM.

First, **communities can generate high quality, credible environmental data** when given the tools and authority to do so. Digital apps designed through participatory processes ensure that monitoring reflects local priorities and realities. Offline functionality, simple interfaces and community defined categories make the tools accessible to all, including women, elders and youth.

Second, **CBM strengthens empowerment and agency**. Communities gain confidence, organisational capacity and a stronger collective voice. As the report highlights, CBM shifts communities "from passive recipients of conservation decisions to active participants who generate evidence and assert claims." Women and youth in particular gain visibility and leadership roles.

Third, **evidence alone is not enough.** The impact of CBM depends on governance environments—whether authorities are willing to respond, whether civic space is protected, and whether communities have safe channels for advocacy. Lebanon shows what is possible when evidence is linked to enforcement; Cambodia shows the limits when political space closes.

Fourth, **data governance and safety are essential**. Communities consistently emphasise the need for control over their data, protection from retaliation, and clear rules for how evidence is shared. CARE principles—Collective benefit, Authority, Responsibility, Ethics—are increasingly central to programme design.

Finally, **sustainability remains a challenge**. Long term funding, local technical expertise, and institutional recognition are necessary for CBM to move from project based innovation to durable governance practice.

RECOMMENDATIONS

Strengthening and Scaling Community Led CBM

The report concludes that CBM can play a significant role in achieving global biodiversity goals—if communities are supported not only to collect data, but also to use it. To achieve this, several priorities emerge.

Programmes must **prioritise safety, sustainability and inclusion**, ensuring anonymity where needed, building local technical capacity, and embedding gender equality and youth leadership. Communities must receive regular feedback on how their data is used, reinforcing motivation and trust.

CBM systems must **strengthen governance and credibility**, with clear validation protocols, community led data governance structures, and accessible data products such as dashboards and reports. Building trust based relationships with authorities and developing advocacy strategies are essential for translating evidence into influence.

Finally, Danmission and its partners have an opportunity to **position themselves as global leaders in Community-Based monitoring**. By developing a cross country CBM framework, producing policy briefs linking CBM to KMGBF and IUCN commitments, and supporting the integration of community data into national reporting systems, the programme can help ensure that community-generated evidence becomes a recognised and valued component of environmental governance.

In **Tanzania**, ZACCA's CoFOMA initiative is building a community driven monitoring system for mangroves. Participatory workshops shaped indicators, workflows and data governance principles, and the app—now fully developed—aims to support both conservation and sustainable livelihoods. The long term vision is a replicable model that **links monitoring to advocacy and alternative income opportunities**.

TANZANIA

In **Kenya**, the Mikoko Yetu project is developing a standardised framework for community led mangrove monitoring. Still in early stages, it seeks to **harmonise fragmented monitoring efforts and embed community evidence into national conservation systems**.

KENYA

1.

FORE WORD

The world is becoming more and more polarized.

Misinformation blurs what is real. Trust, dialogue, and empathy are increasingly under strain. I think there is more need for evidence and bottom-up approaches to inform natural resource management than ever before. Citizens, public authorities, and scientists often hold different views on the status and trends in nature, as well as on the actions needed to manage it.

Many policy documents call for bottom-up approaches to inform natural resource management. At the IUCN World Conservation Congress in 2025 a resolution was decided to 'advance citizen science to support and democratise conservation'. IUCN coordinates a large network of environmental experts – an amazing 15,000 scientists and practitioners. Moreover, IUCN plays a key role in the operationalization of international environmental agreements such as the Convention on Biological Diversity, the Ramsar Convention, and the World Heritage Convention. Also in 2025, the world's countries agreed on the Nice Ocean Action Plan. It says that 'ocean action must be based on the best available science and knowledge, including, where available, traditional knowledge, knowledge of Indigenous Peoples and local knowledge systems'.

The UN's global biodiversity agreement calls on all countries to "support community-based monitoring and information systems". Community-based monitoring engages citizens directly -among them farmers, fishers, hunters, people with a special interest in nature, and other users and managers of natural resources - young and old - by incorporating their knowledge, observations and perspectives into natural resource management and climate action. International experience shows that such involvement not only contributes valuable insight but also unlocks grassroots' potential for change, offering key opportunities for positive outcomes for both people and nature.

With many partners, Danmission has embarked on a visionary programme to embed community-based monitoring within rights-based, community-led environmental governance. Their bold ambition is to scale up, and institutionalize, the use of global 'best practices' in community-based monitoring. This report examines how community-based environmental monitoring initiatives supported by Danmission contribute to inclusive and accountable governance across a range of ecosystems and sociopolitical settings. The report presents analyses of the programmes in five countries and puts them into a collected perspective. I hope readers find the report as useful as I did.

March 2026

Finn Danielsen
Senior Ecologist, NORDECO
(Nordic Foundation for Development and Ecology)

2.

INTRODUCTION

Defining Citizen Science and Community-Based Monitoring

The terms citizen science and community-based monitoring (CBM) have gained prominence in biodiversity conservation and environmental governance over the past two decades.[1] Citizen science (CS) involves non professionals in scientific research—contributing observations, collecting data, conducting analysis or interpreting findings, often in collaboration with professional scientists or institutions.[1] Its scale varies widely, from large distributed networks documenting species occurrence across continents to smaller, locally organised programmes focused on specific ecosystems or concerns.[2]

The term Community-Based monitoring (CBM) is sometimes used broadly to describe monitoring conducted wholly or partly by communities, including programmes designed and led by scientists in which community members primarily contribute data collection.

For the purposes of this report, however, we focus on a more community centred definition of CBM. In this framing, **CBM refers to systematic, long term monitoring conducted by communities, where communities exercise ownership over the monitoring process—deciding what to monitor, how data are collected and managed, and how findings inform local decisions[3]**. This shifts the role of communities from data providers to knowledge generators and agents of environmental governance.

Why Programmes Adopt Community-Based Monitoring

Organisations working in conservation and environmental management increasingly adopt CBM for several interconnected reasons.

First, CBM addresses data gaps: in many regions, state agencies lack sufficient resources or presence to systematically monitor environmental conditions or violations[2]. Communities depending on those lands can provide consistent, granular, real time information otherwise unavailable[3].

Second, CBM creates a formal platform for participation in environmental governance. Rather than periodic consultations, CBM has the potential to structure ongoing engagement in which communities document changes, analyse findings collectively, and use evidence to engage with authorities and policy makers. This shifts communities from passive recipients of conservation decisions to active participants who generate evidence and assert claims[4].

Third, when combined with feedback mechanisms and transparent workflows, CBM enhances accountability and visibility. Digital tools can make environmental violations and management responses accessible to communities, authorities and, where relevant, external stakeholders and media[5]. This transparency deters infractions, incentivises responses, and creates a written record useful for advocacy and enforcement[5].

Danmission's Approach and Programme Context

2014 — Development of the PL App

2015 — Integration of PL app in patrols of PLCN

2020 — PFCN integrated the PL App into the monitoring practice

2021 — MCF integrated the PL App into the monitoring practice

2024 — TERRE Liban launched the Green Rangers initiative in Lebanon

2024 — KESAN starts the app development in Myanmar

2025 — ZACCA started the app development process - ADS pilots a similar project in Kenya

Danmission, a Danish faith based organisation working on nature conservation and climate action, has embedded CBM within a broader rights based and community led approach to environmental governance. Its 2026–2030 Programme Strategy prioritises ensuring that communities whose lives depend on forests and ecosystems are recognised as key governance actors, supported by faith based and civil society partners capable of creating enabling spaces for participation.
This reflects a conviction that **environmental protection and social justice are inseparable, and that communities—particularly those marginalised from formal decision making—have both the right and the capacity to lead conservation efforts[6].**

Danmission's operational experience with CBM began in Cambodia with the Prey Lang app (2014), which demonstrated that community-based digital monitoring could generate credible data and connect to local authority action[7]. Building on this foundation, Danmission supported CBM initiatives between 2020 and 2025 to more forestry networks in Cambodia (Monks Community Forest (MCF), Preah Rokar Community Forestry Network), Myanmar (Salween Peace Park communities supported by Karen Environmental and Social Action Network–KESAN), Lebanon (150 communities across high forest density areas with the help of TERRE Liban), Tanzania (Mangrove communities in Zanzibar supported by Zanzibar Climate Change Alliance–ZACCA) and is setting up a similar approach in Kenya with the help of Anglican Development Service–ADS Pwani and Big Ship Organization[7,8].

Each country's CBM initiative adapted a core model to local contexts: what communities prioritise for monitoring, the workflow for reporting and validation, relationships with local authorities, and how data is translated into advocacy or policy engagement[8]. This programme-level implementation revealed both the potential and the tensions in CBM work: **communities can generate reliable data and mobilise around environmental concerns**, but success depends on factors beyond monitoring itself—including trustworthy relationships with authorities, adequate resources, and genuine pathways for data to influence decisions affecting communities[8].

Global Biodiversity Governance and the Role of Community-Generated Data

The international policy landscape increasingly recognises the roles and rights of Indigenous Peoples and local communities. The Kunming–Montreal Global Biodiversity Framework (KMGBF), adopted in 2022, sets 23 targets and 365 indicators for achieving its four goals by 2030[9]. It calls for a 'whole-of-government and whole-of-society' approach and affirms that
the rights, knowledge systems and decision-making authority of Indigenous peoples and local communities must be respected and integrated into biodiversity conservation and governance at all levels [9,10].

Analysis of the KMGBF monitoring framework shows that about **30 per cent of indicators can directly involve Indigenous Peoples, local communities and citizen scientists in data collection and assessment**, and roughly half could benefit from CBM contributions.

Target 20
Strengthen capacity-building, technology transfer and scientific and technical cooperation for biodiversity

Target 21
Ensure that knowledge is available and accessible to guide biodiversity action

Target 22
Ensure participation in decision-making and access to justice and information related to biodiversity for all

Target 23
Ensure gender equality and social inclusion in biodiversity action

Key target areas where community-generated data is particularly relevant include **Target 20** (Strengthen capacity building, technology transfer and scientific and technical cooperation for biodiversity), **Target 21** (Ensure that knowledge is available and accessible to guide biodiversity action), **Target 22** (Ensure participation in decision making and access to justice and information related to biodiversity for all) and **Target 23** (Ensure gender equality and social inclusion in biodiversity action). This recognition creates both an opportunity and a requirement: **CBM can contribute to national compliance with international commitments** if community-generated data is systematically collected, validated and integrated into reporting and policy processes[4].

As global monitoring architectures evolve, debates on data governance highlight how community-generated data is shared is as important as the data itself.

Discussions around FAIR data principles (Findable, Accessible, Interoperable, Reusable) emphasise technical openness and interoperability to support large-scale analysis and harmonised reporting. In parallel, Indigenous and community actors have articulated CARE principles (Collective benefit, Authority, Responsibility, Ethics), which foreground rights, cultural protocols and community authority over decisions about how data is accessed and used[13]. Danmission is working to include FAIR and CARE principles in the design of new CBM programmes and adopt them in existing programmes.

IUCN Resolution 126 and the Mainstreaming of Citizen and Community Science

In October 2025, the International Union for Conservation of Nature (IUCN) adopted Resolution 126, **"Advancing citizen science to support and democratise conservation"**, at its World Conservation Congress in Abu Dhabi[12]. This was the first IUCN resolution to explicitly mainstream citizen and community science—including CBM—across the Union's work and to call on Members and partners to systematically support and recognise these approaches[12, 13].

The resolution identifies several imperatives; develop strategies and action plans for citizen science engagement; establish task forces to coordinate work; **recognise citizen generated data as legitimate contributions to conservation assessment and decision making**; and provide long term support, capacity building and protection for those engaged in monitoring and advocacy[13]. It also emphasises the need to **protect citizen scientists and environmental defenders from harm** and to ensure that those most affected by conservation decisions—**Indigenous Peoples**, local communities and civil society—have a meaningful **voice in determining priorities, methods and outcomes**[13, 14].

Resolution 126 affirms that **CBM approaches are now integral to global conservation strategy**. It also sets expectations: programmes should strengthen community agency, protect participants, and ensure that community-generated data informs decision-making processes.

Aim and Scope of This Report

This report examines how CBM initiatives supported by Danmission contribute to more inclusive and accountable environmental governance. It analyses programmes across Cambodia, Myanmar, Lebanon, Tanzania and Kenya to understand:

one **How communities use digital tools, structured monitoring practices and data governance strategies to generate environmental data and establish themselves as sources of evidence in governance processes (Chapter 5.1);**

two **How CBM fosters empowerment, internal organisation and agency—particularly among women, youth and marginalised groups (Chapter 5.2);**

three **How communities and partners use CBM data to engage in advocacy, media and policy dialogue (Chapter 5.3);**

four **What common themes, challenges and lessons emerge across contexts regarding sustainability, effectiveness and impact (Chapter 5.4);**

five **How Danmission's CBM work aligns with and contributes to the expectations outlined in the KMGBF and IUCN Resolution 126 (Chapter 5.5).**

The thematic structure presented in the "Common Ground: Themes Across Projects" section reflects the categories used in the global CBM survey (app development, monitoring practice, empowerment, advocacy, enforcement, challenges and lessons learned). These themes serve as analytical entry points through which the broader aims of the report are examined and synthesised in the "Thematic synthesis" section.

On this basis, the report develops recommendations for strengthening community led CBM, enhancing its visibility and recognition in policy processes, and ensuring that community-generated data becomes a routine and valued input in environmental governance at local, national and international scales.

3.

CBM IN COUNTRY CONTEXTS

The preceding chapters have established the conceptual foundations and global policy landscape for community-based monitoring. **This chapter shifts from theory to practice**, examining how Danmission and its partners have operationalised CBM across five country contexts—Cambodia, Myanmar, Lebanon, Tanzania, and Kenya.

Rather than presenting isolated cases, the chapter shows CBM as an adaptive methodology that communities tailor according to local environmental priorities, political conditions, and governance relationships.

FIGURE 1
Map of countries with active or piloted projects

CAMBODIA: From Grassroots Innovation to Political Constraint

2014
COMMUNITY-BASED FOREST MONITORING BEGAN IN PREY LANG

Illegal Logging
Natural Resources
Interactions with Authorities

2015
PLCN INTEGRATED THE APP INTO REGULAR PATROLS

Prey Lang Wildlife Sanctuary (over 400,000 ha, central Cambodia) is the largest lowland evergreen forest in the Indo-Burma biodiversity hotspot and the site where community-based forest monitoring began in 2014. More than 200,000 Kuy Indigenous and Khmer residents depended on the forest for livelihoods and cultural identity, yet had little recognised role in its management. Weak state monitoring and enforcement, combined with logging interests tied to companies, military, and political elites, created a governance gap: communities had knowledge and motivation to act but lacked mechanisms to turn observations into actionable evidence[15]. Despite formal protection since 2016, the sanctuary has suffered the **highest deforestation rates in Cambodia**, driven by Economic Land Concessions, mining operations, and infrastructure projects operating with apparent impunity.

Danmission's engagement started with a two-day workshop in 2014 with 34 members of the Prey Lang Community Network (PLCN), a grassroots forest protection movement formed around the year 2000. Through **participatory mapping** and free-listing, PLCN defined monitoring priorities—**illegal logging, natural resources and interactions with authorities**—and agreed on **full community ownership** of the data. Partners including the **University of Copenhagen (UCPH)**, which ensured scientific rigor, and **Web Essentials (WE)**, which provided the technical expertise for app development, developed the Prey Lang App[16]. The smartphone app was **tailored for users with limited formal education**, enabling patrollers to record observations with **structured menus, photographs, and GPS coordinates**. Field trials produced successive versions of the app, each refined through community feedback[17].

From 2015 onward, PLCN integrated the app into regular patrols, both local and coordinated campaigns, gradually building confidence in using technology to document forest conditions and violations. Geo-referenced photographic evidence replaced anecdotal reports, strengthening credibility with authorities and media. **Older members and women adopted the app** alongside younger men, challenging prevailing assumptions about digital tools, while training expanded to rights awareness, forest law, and digital security, reinforcing advocacy capacity[17].

Supported by data managers and the University of Copenhagen, PLCN compiled monitoring results into **quarterly reports in Khmer and English**, presented at press conferences and shared with government agencies and international fora[18]. This strategy **amplified visibility of forest crimes, positioned PLCN as a knowledge provider in global biodiversity debates, and earned international recognition**, including the UN Equator Prize and Yale ISTF Innovation Prize[19]. Yet visibility also brought risk: PLCN became a political target.

By 2020, the government banned PLCN patrols, **surveillance of environmental defenders intensified**, and civic space narrowed further after the 2023 government leadership transition. For years members faced **threats of arrest and accusations of "foreign interference**," while official rhetoric reframed environmental protection as obstruction to development. Technically, the monitoring system remained functional, but its political leverage declined gradually[19].

From 2020 onward, this community-based monitoring approach was scaled to two additional protected areas through the Citizens Engaged in Environmental Justice for All (CEEJA) project. **CEEJA ran from 2020 to 2025** and was implemented by a consortium led by Danmission, with the aim of strengthening the capacity of forest-dependent communities to protect their environmental rights through on-the-ground smartphone monitoring, satellite remote sensing, and policy advocacy across **three wildlife sanctuaries**[17].

The Preah Rokar wildlife sanctuary

90.000 hectares near Cambodia's Thai border

15.000 forest-dependent Kuy and non-Kuy Indigenous people

22 villages

2020
PFCN INTEGRATED THE APP INTO THEIR MONITORING PRACTICES

The Sorng Rokha Vorn wildlife sanctuary

30,254 of evergreen forest

3700 forest-dependent people

2021
MCF INTEGRATED THE PREY LANG APP INTO THEIR MONITORING PRACTICES

Preah Rokar Wildlife Sanctuary **(over 90,000 ha, northern Cambodia near the Thai border**) is home to **more than 15,000 forest-dependent Kuy and non-Kuy Indigenous people** across 22 villages.

The Preah Rokar Forestry Community Network (PFCN), active for over two decades, adopted the Prey Lang App from 2020 onward, scaling up georeferenced documentation of illegal logging and biodiversity—particularly resin trees critical to community livelihoods.

Members face restricted forest access, illegal timber transport operating day and night, and increasing legal targeting by courts, while authority responses to documented crimes remain inadequate[17].

Sorng Rokha Vorn Wildlife Sanctuary (30,254 ha of evergreen forest, northwest Cambodia) was initiated by Buddhist monk Venerable Bun Saluth in response to accelerating deforestation.

The Monk Community Forest (MCF) integrated the Prey Lang App in 2021, adding **systematic digital documentation** to its traditional tree-blessing ceremonies, and its work directly benefits more than **3,700 forest-dependent people**.

Persistent challenges include **rosewood logging, wildlife trafficking, and forest clearing** for land ownership, while **intense political pressure** has constrained the network's monitoring activities[17].

The Cambodian case illustrates both the potential of community-based monitoring—robust evidence, empowerment, and global visibility—and its dependence on governance environments that allow evidence to influence decisions.

FIGURE 2
The Prey Lang Community Network

LEBANON: From Crisis Response to Citizen-Led Enforcement

Lebanon's forests have been under severe pressure in recent decades, with fires, illegal cutting, unregulated land conversion, and waste dumping all contributing to widespread degradation. Climate change—through droughts, rising temperatures, and longer dry seasons—has further increased wildfire risk and ecological stress[21]. Governance failures exacerbate these threats: enforcement is weakened by corruption, scarce public resources, and political interests aligned with extractive activities, leaving forest adjacent communities to bear the costs without meaningful influence over decisions[23].Building on two decades of environmental education, TERRE Liban launched the EU funded Green Police initiative in 2022, enabling citizens to report environmental violations to the Internal Security Forces (ISF).

This experience guided Danmission's partnership with TERRE Liban and the creation of the Green Rangers application[22] initiative in 2024. The premise was clear: state capacity alone could not protect forests; communities themselves needed tools to monitor violations and channel evidence into enforcement pathways[23].

TERRE Liban engaged communities across ten districts, equipping them with digital and hotline reporting mechanisms. Reports were screened by a multidisciplinary team, with field officers verifying cases when necessary[24]. Anonymity allowed citizens to contribute without fear of retaliation, while TERRE Liban formally submitted validated cases to authorities. This structure strengthened trust, improved the credibility of evidence, and created a direct link between communities and enforcement institutions[23].

Women and youth were central to the model. Women, as primary users of non-timber forest products, became key observers and reporters, while youth climate activists engaged in outreach and app promotion, supported by a Youth Climate Academy that built skills in climate adaptation and biodiversity stewardship[23].

Despite these gains, Green Rangers faced significant constraints: patchy connectivity in remote forest areas, enforcement capacity stretched thin, penalties too low to deter profitable illegal activities, and risks for field staff and digital infrastructure[25].

2024

TERRE LIBAN LAUNCHED THE GREEN RANGERS INITIATIVE IN LEBANON

FIGURE 3
The Green Rangers project participants

The Lebanese case shows how CBM can work "with" limited state capacity by routing citizen evidence into official channels, while underscoring that sustainable impact depends on stronger penalties, reliable enforcement, and long term institutional and financial support[23].

MYANMAR: Participatory Design in a Conflict Context

2024

REPRESENTATIVES OF KESAN JOINED EXCHANGES TO CAMBODIA TO LEARN FROM PLCN ABOUT PARTICIPATORY APP DESIGN AND COMMUNITY DATA GOVERNANCE

The Salween Peace Park spans one of the world's most biodiverse forest landscapes in Myanmar's Dawna Tenasserim region. It is home to endangered species, major carbon stocks, and the cultural and spiritual life of Karen Indigenous communities. Decades of civil war created chronic insecurity and weak governance, while the 2012 ceasefire opened space for new pressures—mining, plantations, and industrial logging—that intensified after the 2021 military coup.

Forests remain central to Karen survival, providing food, medicine, water, spiritual identity, and refuge in times of violence. Yet monitoring relied on scattered patrol notes and basic GPS records, leaving environmental crimes undocumented and advocacy efforts underpowered[26].

Danmission's engagement began with peer learning. **In 2024, representatives of the Karen Environmental and Social Action Network (KESAN) joined exchanges in Cambodia to learn from PLCN about participatory app design and community data governance**. These visits confirmed that digital tools could be adapted to Karen contexts—and that communities should lead the design[27].

In 2024, Danmission, KESAN and University of Copenhagen convened a **five day participatory design workshop with 20 participants—forest rangers, district coordinators, village leaders, and women from biodiversity groups—across four townships**. Early sessions explored how communities understand their forests: as sources of livelihood, water, spiritual meaning (including "umbilical trees" linked to birth), and security. **Participants identified key threats such as illegal logging, unsustainable hunting, non compliance with community rules, landslides, and fires—and mapped patrol routes, cultural sites, and accessibility constraints[27]**.

Each township defined its own monitoring priorities through free listing, resulting in a shared decision tree that balanced common concerns with local distinctiveness. Facilitators translated these inputs into a mock up mobile app, refined in real time with KESAN. The design emphasized simplicity, offline functionality, and alignment with community logic. Field testing revealed practical issues—terrain, connectivity, GPS performance—and helped refine patrol protocols and data visualization options. The guiding principle remained: communities lead; technology serves[27]. The Kawthoolei Ecosystem Resilience and Biodiversity Watch Application (KERBWA) is now fully functional and available on the Google Play Store , marking a significant milestone in community-led digital forest monitoring in conflict-affected areas. The process also established a governance structure for the monitoring system, integrating representatives from 35 villages, the Karen National Union, and the Kawthoolei Forestry Department. Plans for a community review board aim to uphold Indigenous data sovereignty, with women researchers explicitly included as decision makers[26].

All of this unfolded under severe constraints: active conflict zones, extreme weather, and fragile infrastructure demanded adaptive planning and cautious fieldwork[28]. **KESAN's sustainability strategy centers on long term community ownership, local technical expertise, and future workshops to expand monitoring[26]**

FIGURE 4
Community representatives from Myanmar

The Myanmar case shows that community-based monitoring can be designed even in conflict settings—but its long term viability depends on evolving security conditions and the resilience of Indigenous institutions[25].

TANZANIA: Building Community-Driven Evidence Systems for Coastal Mangrove Protection

2025

COMMUNITY-BASED FOREST MONITORING APP (COFOMA), IMPLEMENTED BY THE ZANZIBAR CLIMATE CHANGE ALLIANCE (ZACCA) WITH SUPPORT FROM DANMISSION

Zanzibar's mangrove ecosystems on Unguja and Pemba islands are under growing pressure from unsustainable harvesting, biodiversity destruction, and wider threats to natural resources and marine biodiversity. Climate change compounds these pressures through sea level rise, flooding, and salinity changes, while population growth and urban expansion intensify demand for mangrove wood and coastal land. As islands with limited alternative resources, communities depend heavily on mangroves for livelihoods, yet traditional patrols and reporting systems have not generated consistent, georeferenced data for management or enforcement[29]

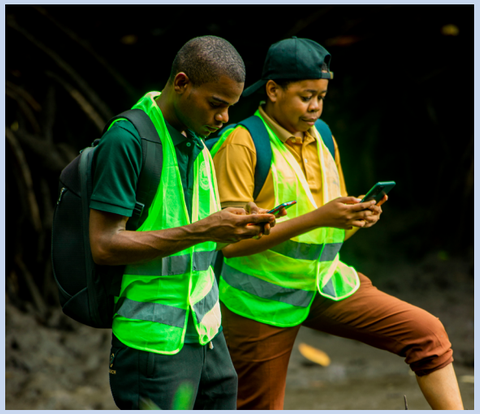
The Community-Based Forest Monitoring App (CoFOMA), implemented by the Zanzibar Climate Change Alliance (ZACCA) with support from Danmission, was conceived as a pilot to bridge this gap by pairing community patrol systems with digital tools. Preparatory work included resource assessments and consultations with local cooperatives, leading to the selection of two pilot sites: Uzi Nyeke in Unguja (TUSTAHAMILIANE cooperative) and Mgogoni in Pemba (JUUMAPE cooperative). These communities were engaged from the outset, identifying priorities, mapping forest areas, and co designing the monitoring system[30].

A participatory workshop brought together community members, ZACCA staff, government representatives, and partners. Sessions explored community livelihoods, existing patrol practices, and the limits of notebook based documentation, while discussions on data sovereignty and citizen science framed communities as owners and producers of data. Participants articulated what they wanted from monitoring: **the ability to systematically document biodiversity destruction and ecosystem threats, strengthen advocacy with authorities, and gain recognition as forest stakeholders**. Testing of a prototype app in forest conditions allowed refinement of protocols and built confidence in its use[31].

At present, the app has been fully developed and is pending publication, while ZACCA is planning training sessions for community members ahead of full deployment[30].

The aspiration is not only to provide a functional monitoring tool but also to **establish community controlled data governance systems, create accessible data products such as dashboards and reports, and ensure feedback mechanisms so communities know how their reports are acted upon**[29]. As of February 2026, the app is fully developed and pending publication to the Google Play Store.

Looking ahead, ZACCA and its partners envision CoFOMA as more than a technical solution. It is intended as a **replicable model for community driven mangrove conservation**, linking monitoring to advocacy and to alternative livelihoods such as eco tourism, beekeeping, aquaculture, and renewable energy.



Sustained monitoring will require ongoing training, local data champions, and strong safety protocols, but the long term aspiration is clear: empower communities to be recognised as experts and custodians of their ecosystems, ensuring that mangrove protection becomes both a local priority and a national policy commitment[29].

FIGURE 5
Community representatives from Uzi Nyeke in Unguja and Mgogoni in Pemba, Zanzibar

KENYA: Building a Standardised Framework for Community-Led Mangrove Monitoringt

The Mikoko Yetu ("Our Mangroves") project in southern Kenya, implemented by Anglican Development Service Pwani in partnership with Big Ship Organization, is still in its initial planning and design phase. It responds to a distinct challenge: fragmented mangrove monitoring. At present, multiple actors—Community Forest Associations (CFAs), Beach Management Units (BMUs), NGOs, government agencies, and researchers—collect data using divergent methods. This lack of coherence limits the comparability of information and its policy relevance, even as mangrove ecosystems face mounting pressures from unsustainable harvesting, coastal development, and climate change[32]. The project's goal is to **co create a standardised, Community-Based monitoring framework that can be applied across sites while remaining sensitive to local contexts and grounded in community ownership**. Mikoko Yetu is built around extensive stakeholder engagement and participatory design, bringing together CFAs, BMUs, youth and women's groups, conservation organisations, the Kenya Forest Service, and research institutions in a shared process[32].

The roadmap unfolds in three phases.

The first focuses on stakeholder mapping, participatory rural appraisals, and consultations to identify key mangrove health indicators, document existing practices, and select pilot sites that represent diverse ecological and social conditions Capacity building is envisioned alongside this work, strengthening the technical and institutional abilities of local actors as the framework emerges.

The second phase will involve co designing a user friendly data collection tool that integrates Indigenous knowledge with digital capabilities, followed by pilot testing and iterative refinement.

The third phase aims to institutionalise the framework within government programmes and regional conservation initiatives, supported by a data management system that transforms community observations into accessible decision support for stakeholders[32].

CO-CREATE A STANDARDISED, COMMUNITY-BASED MONITORING FRAMEWORK

Across all phases, Mikoko Yetu explicitly emphasises **data sovereignty and community control over information**, ensuring that evidence generated by communities informs both policy and enforcement. The project seeks to **reposition communities from passive implementers of conservation directives to active evidence providers and policy interlocutors**. It also recognises that long term engagement depends on viable livelihoods: monitoring is linked to ecosystem based income opportunities, including eco tourism models such as the Gazi Women Boardwalk, and to the deliberate inclusion of youth and women as future custodians and leaders[32].

Although still in its formative stage, **Mikoko Yetu aspires to produce lessons and tools that can serve as a blueprint for participatory, standardised environmental monitoring.**

By harmonising fragmented efforts and embedding community ownership, the project aims to strengthen mangrove conservation in Kenya while offering a model adaptable to other coastal ecosystems.

FIGURE 6
Initial community consultations in the Mikoko Yetu project in Kenya

4.

COMMON GROUND:

THEMES ACROSS PROJECTS

The five country narratives presented in the preceding chapter reveal distinct CBM trajectories, shaped by different ecological contexts, institutional arrangements, and political dynamics. Yet beneath this diversity, common patterns emerge—shared drivers of community participation, recurring tensions in authority relations, persistent challenges in sustaining momentum, and repeated instances where community-generated data has influenced policy and practice. To investigate these patterns, we employed the following methods.

This chapter shifts perspective to examine these cross-cutting themes systematically. By analysing experiences across Cambodia, Lebanon, Myanmar, Tanzania, and Kenya, we identify which aspects of CBM design, implementation, and impact appear robust across contexts, and which require adaptation to local circumstances. Understanding these patterns is essential for distilling lessons that can inform future CBM initiatives and for recognizing the foundational elements of effective community-led environmental governance.

To ensure transparency and rigor in this comparative analysis, we first detail the methodology through which individual programme experiences were synthesized into overarching themes.

METHODOLOGY

Initial Stakeholder Engagement: Focus Group Discussion

The analytical process began with a focus group discussion (FGD) convening Danmission programme managers from Cambodia, Lebanon, Myanmar, and Tanzania/Kenya. Using open-ended questioning, the FGD explored programme experiences across several dimensions: the motivations and strategies driving CBM implementation; operational achievements and challenges; relationships with local authorities; and mechanisms for translating community-collected data into policy engagement and governance change.

This initial consultation served a dual purpose: **it provided programme staff perspectives on CBM outcomes, and it identified priority topics and nuances that required deeper investigation at the local partner level**.

Thematic Analysis and Synthesis

Responses to partner questionnaires analysed to identify common patterns, recurring challenges, and shared lessons across the five countries. Rather than treating each country as an isolated case, **the analysis explicitly sought convergence—the themes, strategies, and obstacles that appeared across different geographical, institutional, and ecological contexts**.

This synthesis revealed which aspects of CBM design and implementation appeared to be context-specific and which seemed to reflect broader dynamics shaping how community-generated data engages with governance processes.

The resulting themes form the foundation for this report:

THEMES A-F are explored in dedicated sections that follow

THEME G (LESSONS LEARNED FOR FUTURE INITIATIVES) is synthesized directly into the report's recommendations on strengthening community-led CBM and deepening its recognition in environmental governance.

Respondent Background and Data Context

The questionnaire gathered **8 respondents** from five Danmission CBM country programmes and their affiliates: Cambodia, Kenya and Lebanon (2 respondents each); Myanmar, and Tanzania (1 respondent each). **This spread captures diverse ecological and political contexts**—from evergreen forest sanctuaries in Cambodia to mangrove ecosystems in East Africa, and from conflict-affected Karen territories in Myanmar to Lebanon's high forest density areas—providing a rich comparative base.

Respondents were overwhelmingly ground-level practitioners: 7 out of 8 represented local CSOs/NGOs directly implementing CBM activities, while there was also one Danmission staff. This composition ensured that the findings reflect community-embedded perspectives and operational realities, highlighting the trade-offs faced in day-to-day implementation.

The five CBM initiatives span **multiple stages of maturity**, reflecting both emerging experimentation and established practice. Projects range from initial design and app development phases in Kenya and Tanzania, through pilot testing in Myanmar, to regular implementation in Lebanon and Cambodia.

Data collection status similarly varies across contexts. Kenya and Tanzania have not yet begun field data collection, Myanmar is gathering occasional pilot data during its testing phase, Lebanon has established regular but geographically limited data collection, and Cambodia has achieved regular large-scale data gathering. This variation enables the analysis to distinguish between forward-looking insights shaped by design and piloting experiences, and operational lessons grounded in sustained monitoring practice. Together, the five cases provide a balanced lens on how CBM is envisioned, tested, and scaled across diverse geographical and institutional contexts.

CBM PROJECT MATURITY AND DATA COLLECTION STATUS

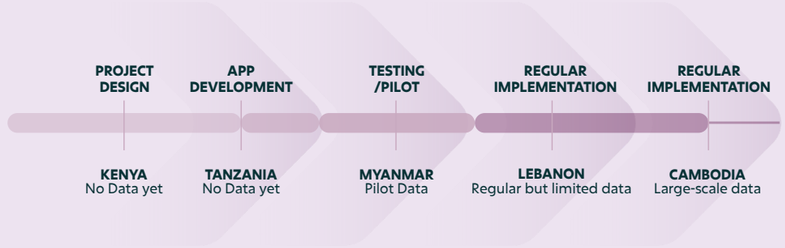


FIGURE 7
Project maturity and Data collection status across the five county projects

Theme A

App Development and Local Adaptation

Across programmes, app development was consistently approached as a participatory process rather than a purely technical exercise. The FGD highlighted **Lebanon's nationwide survey of 150 activists** to identify monitoring categories, **Cambodia's workshop-based co-design** through the Prey Lang initiative, and **Myanmar's learning visit to Cambodia** before adapting core ideas to its own conflict-affected context. In East Africa, **COFOMA in Tanzania and Mikoko Yetu in Kenya** are following similar pathways, combining technical development with stakeholder workshops and community mapping.

Who Gets a Seat at the Table

Survey results confirm that community members are the foundation: all **respondents (100%) identified them as intended users**. Six also included official authorities, while two respondents (both from Lebanon, extended access to the general public).
These choices reflect different governance strategies.

» Lebanon deliberately designed its app to involve authorities and the wider public, combining digital monitoring with social media advocacy.

» Myanmar, Tanzania, and Kenya also included authorities from the outset, embedding institutional recognition into design.

» In Kenya, this was framed explicitly as "the app will be developed by the community and for the community," underscoring that while government concerns would be considered, community priorities had to lead.

» Cambodia's forestry networks, by contrast, excluded authorities altogether to preserve community autonomy, ensuring that monitoring categories reflected only community perspectives.

COMMUNITY MEMBERS are the Foundation

Translating Experience into Technical Requirements

All cases scored the importance of community involvement in defining monitoring categories as high. **Lebanon's survey identified core threats before coding began**, and its app built in GPS, using photo evidence, and anonymity to protect monitors. **Myanmar embedded Indigenous representatives** throughout development, ensuring categories reflected "local realities, Indigenous terminology, and customary land-use," while also demanding offline functionality and audio recording for rangers who may be illiterate. **Cambodia likewise prioritized offline use**, simple icons, and the ability to record local names of plants and animals, designing the app to run on low-cost Android phones. **Kenya emphasized that design must remain community-driven**, with features validated directly by local representatives.

These examples show how context shapes design, and highlights that design is not a one-off consultation but an ongoing dialogue where lived experience translated directly into technical features—anonymity for safety, audio recording for literacy constraints, biodiversity names in local languages, and simplified interfaces for demanding patrols.

CONTEXT shapes Design

The Authority Question: Early Alignment or Community Autonomy?

BALANCE between institutional alignment and community autonomy

Responses on authority involvement ranged widely: **three reported strong involvement, three minimal, and two moderate**. **Lebanon and Myanmar embraced early co-design with authorities**, embedding institutional understanding into the process. **Cambodia deliberately excluded authorities**, prioritizing community control and preventing dilution of priorities.

These divergent strategies reflect different theories of change: **whether legitimacy comes from institutional alignment or from community autonomy.**

Design Choices Encode Values

THE APP'S ADAPTIVE DESIGN embedds local priorities such as offline functionality, safety features, Indigenous terminology, and simple interfaces into technical choices

Community respondents consistently rated their apps as closely aligned with local priorities. This alignment was grounded in concrete design decisions. **In Lebanon, anonymity was built in from the start**, with GPS and photo evidence included but personal data concealed to protect monitors in conflict settings. **Myanmar's rangers demanded offline functionality and audio recording**, ensuring the app could be used in remote patrols and by those with limited literacy, while categories were validated to reflect Indigenous terminology and customary land-use. **Cambodia likewise prioritized offline use**, simple icons, and the ability to record local names of plants and animals, designing the app to run on low-cost Android phones while **Kenya reinforced that monitoring categories must emerge directly from community voices**.

Adaptation to local conditions was nearly universal, with **87.5% of respondents scoring 4–5**. Here too, the qualitative detail shows how adaptation was expressed. **Offline functionality was a common demand** across contexts, while **user interfaces relied on icons, photos, and audio** rather than text. **Language choices embedded Indigenous terminology and customary categories**, ensuring biodiversity was recorded in ways communities actually use. **Safety features were foundational design principles**, not afterthoughts: anonymity in Lebanon, audio recording in Myanmar, simplified interfaces in Cambodia. **Every "technical" choice encoded a value**—whose knowledge counts, who is safe, what pace of work is realistic, and what resources are available. **Design is never neutral.**

CONCLUSION

Theme A, "App Development and Local Adaptation", demonstrates that participatory app design was central to CBM.

Communities shaped categories, features, and interfaces, and their priorities are traceable in the code itself. **Apps reflect local realities** brilliantly, adapt intelligently to conditions and embed safety and cultural values.

The **divergence on authority involvement** highlights competing theories of change, but across contexts the lesson is clear:

CBM technology succeeds when it is context-first, not technology-first.

Design is an ongoing conversation between community knowledge and technical capability, and every choice carries meaning for governance, legitimacy, and sustainability.

Theme B

Community-Based Monitoring Practice

All programmes except Kenya have progressed beyond design and are grappling with the practical realities of operationalizing community-based monitoring at scale.

In Lebanon, the app has successfully reported 72 violations from February to August 2025, mostly related to illegal logging and forest fires, though the present challenge is tracking cases from report to action. **In Myanmar, KESAN's work with Karen National Union (KNU) authorities** is shifting from conventional patrolling toward a more systemized, data-driven approach to compile data and support policy formulation, starting with three target areas. **In Tanzania, the COFOMA app is undergoing initial training with community actors** selected for data collection in mangrove forests, with community reception positive though still in development phases. **In Kenya, the Mikoko Yetu project aims to improve monitoring capacity in coastal mangroves**, building on local initiatives that currently lack strong technology support. **Cambodia's monitoring programme combines satellite imagery analysis with on-the-ground monitoring by local communities** using mobile apps to report violations, though data use remains limited and reports are often rejected by authorities. **Shared challenges across programmes were: the transition from designing effective monitoring systems to sustaining regular, structured, reliable data collection and operationalizing feedback mechanisms that keep communities engaged.**

Frequency and Regularity of Monitoring

Monitoring frequency varies widely across the eight initiatives, reflecting differences in **project maturity rather than differences in community engagement or programme performance.** The survey responses span projects at very different stages of development—from fully operational systems to initiatives still in design or early testing and monitoring frequency should therefore be interpreted in relation to each project's current phase.

Fully operational initiatives such as **Lebanon's Green Rangers and Cambodia's CBM programmes reported moderate to frequent monitoring**, consistent with their established implementation structures. In contrast, **Myanmar's KERBWA, still in a testing and pilot phase**, reported lower frequency, which is expected during early-stage data gathering and system refinement. **Tanzania's COFOMA, currently in app development**, and **Kenya's Mikoko Yetu, still in preparatory design**, understandably reported **limited or anticipated monitoring** rather than regular field data collection.

Structuring Monitoring Procedures

Monitoring procedures are generally well-defined. Lebanon's respondent described a workflow where community records come through the app or hotline, are sorted by coordinators, investigated by field officers, and backed by legal consultants before submission, illustrating how layered procedures reinforce credibility. Myanmar emphasized structure through routine patrols guided by locally agreed schedules and safety protocols, embedding predictability in everyday monitoring. Cambodia highlighted community-level coordination, with members collecting data during regular activities, staff compiling it quarterly, and yearly results discussed in community meetings to agree on actions, showing how procedures are embedded in organizational life. Project accounts show that structuring is about creating systems that balance reliability with community ownership, keeping monitoring both credible and locally grounded.

They also highlight how procedures are woven into community organizational life, emerging from local practices rather than being imposed externally.

Digital versus Manual Monitoring

HOW MUCH OF THE MONITORING IS DIGITAL (VIA APP, GPS, ETC.) VS (PAPER, INFORMAL REPORTING)

50% ★★★★☆
25% ★★★☆☆
25% ★★☆☆☆

Monitoring practices lean strongly toward digital tools, with half of projects relying heavily on apps, GPS, and digital reporting systems. Only two projects indicated a more balanced mix of manual and digital methods.

Lebanon's Green Rangers described a hybrid process: "Community report through the app or mostly through the hotline, the application coordinator sorts the violations reported, the field officers are sent on a field investigation..." — illustrating how **digital inputs are followed up by manual verification.**

Myanmar emphasized digital integration during patrols: "During patrols, they will use the KERBWA app to record forest conditions, biodiversity observations, and any signs of illegal activity."

Cambodia highlighted community-level use of the Prey Lang app, where "community members collect monitoring data during regular activities... staff review and compile the data, usually on a quarterly basis."

Together, these accounts show that digital tools are becoming central to CBM, but they are embedded within workflows that still rely on manual investigation, community meetings, and validation. This balance ensures monitoring remains both technologically enabled and socially grounded.

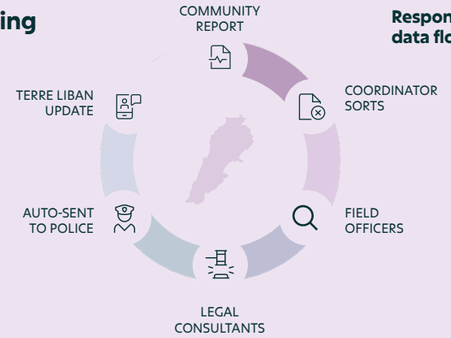
FIGURE 8
Patrollers in Cambodia manually reporting findings, before the introduction of the PL app

Data Reliability and Consistency

62,5% ★★★★★
25% ★★★★☆
12,5% ★★★☆☆

Respondents had a high confidence in the CBM data **expressing minor reservations only five respondents (62.5%) rated 4, two (25%) rated 5, and one (12.5%) rated 3.** Reliability is reinforced through practices like Myanmar's collective validation where "data is reviewed and validated during community or Indigenous Conserved Territory meetings", Lebanon's Green Rangers combining field checks with legal expertise so "legal consultants and advocacy experts work alongside to back up the violation", and Cambodia's routine compilation where "information is discussed in community meetings to identify issues and agree on actions." Hence confidence rests on layered validation embedded in community practice, ensuring monitoring remains credible and locally grounded.

The Monitoring Cycle: From Collection to Action



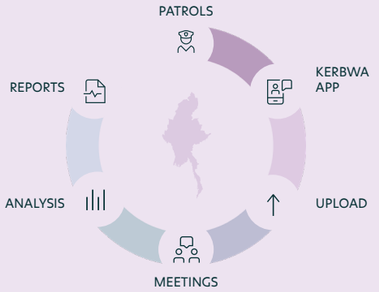
LEBANON'S WORKFLOW: From community report to updates

Respondents described structured workflows regarding data flows from collection to institutional use.

Lebanon's cycle emphasizes validation and institutional connection: "Community report through app or hotline → application coordinator sort violations → field officers sent on investigation → legal consultants back violation with evidence and laws → report automatically sent to police → TERRE Liban receives update on violation status."

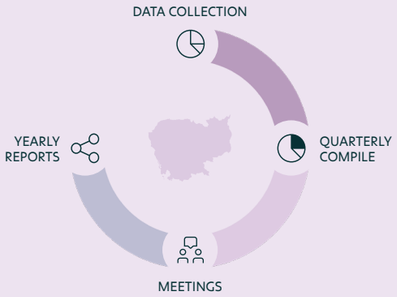
This explicitly closes the loop through institutional feedback.

MYANMAR'S WORKFLOW: From patrols to reports



Myanmar's cycle emphasizes community-level analysis: "Community rangers conduct routine patrols according to agreed schedules → use KERBWA app to record observations → data uploaded when connectivity available → reviewed and validated during community meetings → analysed by community leaders and Karen Forest Department (KFD) staff to identify trends, plan follow-up patrols, and contribute to reports for decision-making, advocacy, conservation, enforcement and policy engagement."

CAMBODIA'S WORKFLOW: From data collection to yearly reports



Cambodia's cycle emphasizes community deliberation: "Community members collect data during regular activities (monthly or seasonal) → staff review and compile data quarterly → information discussed in community meetings → yearly summarized results shared with local authorities, networks, or NGOs and used for reporting, planning, and advocacy."

There is a significant variation in whether analysis happens at community level or at institutional level, how frequently feedback occurs, and what types of action result.

The workflows suggest information moves from communities to authorities, intermediary organisations provide validation, but community-level feedback about whether enforcement occurred is rarely available.

CONCLUSION

Most (four out of five) CBM programmes have moved from design into implementation, establishing structured procedures and producing data that participants regard as reliable.

Variation exists in how regularly communities collect observations and whether monitoring cycles consistently use tangible feedback. Because initiatives are at different stages of development—from early piloting to full implementation hence data collection frequency ranges from occasional to regular.

This variation reflects the **programmes' differing levels of maturity rather than differences in community commitment**, while still highlighting the broader challenge of sustaining consistent monitoring over time. Digital–manual hybrids are the norm: apps, GPS, and reporting platforms are central, but they remain embedded in workflows that rely on manual verification, community meetings, and local deliberation. **This balance ensures credibility and shows that technology cannot stand alone** in monitoring systems. Confidence in data reliability is high, suggesting that internal validation procedures are working.**The critical issue that emerges is whether governance and enforcement systems are effectively adopting and using community-generated evidence**. Communities are producing structured, validated, and credible data. The question is whether authorities act on it — closing the flow from monitoring to meaningful environmental protection.

Theme C

Empowerment and Agency

Community empowerment through monitoring emerges as both a demonstrated outcome and an underlying motivation across all contexts.

In Cambodia, participants emphasized that **CBM "empowers communities to participate in forest protection, enhances transparency, and supports advocacy** for stronger environmental policies." **In Myanmar, KESAN's emphasis on "data supports advocacy** for community rights and the future establishment of federal democratic governance" signals that monitoring is understood as a tool for deeper governance transformation. **In Lebanon, the integration of 150 communities through core groups "**raising awareness about the app and environmental law" reflects a strategy to build community knowledge and agency. **In Tanzania and Kenya**, respondents highlighted that **CBM must meaningfully link environmental protection with livelihood benefits and community recognition**, or participation will diminish. Yet the FGD articulated a critical challenge: "

The community does very crucial work, but since they have high interests in conservation and their power is low, then the most powerful people are not seeing their work."

COMMUNITY EMPOWERMENT via monitoring drives participation and advocacy, but power imbalances limit impact unless linked to governance and livelihoods.

Community Confidence to Speak Up

When asked about CBM's impact on community confidence to speak up about environmental problems, responses were notably strong: six respondents (75%) reported significant confidence **increases (score 4), and two (25%) reported high increases (score 5)**. No respondent reported that CBM had failed to build confidence.

Lebanon's respondent shared a concrete example: "In a very preserved rural area **in Lebanon a woman was brave enough** to report the violations of a neighbour illegally cutting Juniperus trees. Because of the **anonymity of the reports**, she felt confident to report us all the information." The woman's courage depended on technical protection—illustrating that confidence is enabled by structural safeguards. **Myanmar's respondent** emphasized transformation of role: "Community rangers, women's group members, and youth contributed to **defining monitoring categories and app functions**, which reinforced their role as knowledge holders rather than data collectors." This shift from data collector to knowledge holder represents a deepening of confidence. **Cambodia documented confidence through evidence credibility**: "Because the information was systematically collected and verified, local authorities took the findings seriously and invited community representatives to joint meetings. This increased the community's confidence to speak up." Confidence grew from witnessing that systematic evidence generated respect.

CBM significantly boosts community confidence to speak up, with **75% reporting strong increases and 100% positive impact**, enabled by anonymity, knowledge roles, and credible evidence.

Community Influence in Local Decision-Making

25% ★★★★★
62.5% ★★★★☆
12.5% ★★★☆☆

CBM SHOWS MODERATE INFLUENCE ON DECISION-MAKING opening dialogue doors but facing uneven formal authority, with context-specific progress in recognition.

The picture becomes more complex regarding decision-making influence. Survey results show influence is moderate: **two respondents (25%) rated 5, five (62.5%) rated 4, and one (12.5%) rated 3**.
This suggests CBM is opening doors to dialogue but formal authority remains uneven.

In Kenya, communities that had long conserved mangroves noted they were **"not often included in decision-making roundtables,"** yet envision the CBM initiative to **create a bridge to government discussions**. **Myanmar's pilot phase** showed **early recognition**, with representatives presenting findings to Salween Peace Park leaders, strengthening their role as legitimate contributors. **Cambodia** reported that when evidence was "**systematically collected and verified**," authorities invited community monitors to joint meetings, **shifting perceptions from informal activists to recognized stewards**. **Lebanon** highlighted how anonymity emboldened participation, allowing even vulnerable individuals to report violations confidently. Together, these accounts show CBM is gradually **translating community voice into influence**, though the degree of recognition still depends on context and institutional openness.

Community Sense of Ownership

CBM STRONGLY FOSTERS COMMUNITY OWNERSHIP over resources through collective action, documentation, and data interpretation, turning voices into tangible stewardship.

Respondents were strongly positive on community sense of ownership over forests and natural resources. **In Lebanon, ownership was reinforced through collective action**, as faith-based actors stopped a violation and restored damaged land — showing how reporting and follow-up can translate into tangible stewardship. Kenya emphasized that documenting restoration prevents duplication, noting that CBM ensures **"real work would be done on the ground, not just paperwork." Tanzania** highlighted practical enforcement, where illegal catches could be reported simply through the app, **giving communities a direct role** in protecting resources. Together, these accounts show that ownership grows when CBM makes local voices heard, **turns reporting into action**, and gives communities tools to defend their forests in ways that are recognized both internally and externally. **Cambodia** emphasized that **ownership grows through participation**: "The information is discussed in community meetings to identify issues and agree on actions." Community participation in interpreting and acting on data deepens ownership. This suggests ownership emerges from **three mechanisms: collective action producing visible results, documentation of community effort and achievements, and participation in interpreting and acting on data**.

CBM's Importance for Long-Term Rights Defense

CBM IS VIEWED AS HIGH/VERY HIGH IMPORTANCE (7/8 respondents) for communities' long-term rights defense, transforming monitoring into essential infrastructure for evidence-based accountability and governance advocacy.

CBM's importance for communities' long-term ability to defend rights and interests, **seven out of eight respondents reported high or very high importance**, and one reported moderate importance. Communities view CBM not merely as monitoring but as **essential infrastructure for protecting resource rights and governance authority**. **Lebanon emphasized the role of evidence in accountability**: **"The strengthened coordination between TERRE Liban, the Lebanese Ministry of Agriculture, and the police operations unit** has resulted in **faster and more effective responses** to reported forest violations." Institutional responsiveness depends on credible evidence generated by communities. Myanmar articulated rights protection as political: "**Data supports advocacy for community rights and the future establishment of federal democratic governance**." Monitoring becomes a tool for rights and deeper governance transformation. Systematic evidence **converts informal activists into recognized long-term stewards**—a transformation that becomes capital for defending rights. This suggests CBM's importance for rights defense rests on its capacity to: **generate evidence that institutional actors respect, create pathways for community advocacy, and establish legitimacy that can be leveraged in negotiations**.

CONCLUSION

Theme C "Empowerment and Agency", demonstrates that CBM is not only a technical exercise but a social and political process that reshapes community standing.

Across contexts, communities report **high confidence to speak up, growing though uneven influence in decision-making, a strong sense of ownership over natural resources, and recognition of CBM as essential for defending long-term rights**. What emerges is a consistent pattern: CBM builds agency by **converting local knowledge into credible evidence**, **protecting monitors** through safeguards, and **opening pathways to dialogue** with authorities.

Yet the findings also highlight a gap — while confidence and ownership are firmly established, **formal influence in governance structures remains limited** and conditional. This tension underscores the dual role of CBM: it **empowers communities internally while simultaneously testing the willingness of institutions to acknowledge and act** on community-generated knowledge.

Empowerment outcomes vary by how CBM is embedded in governance: examples where ownership and confidence are strongest involve closed feedback loops where evidence triggers visible action by authorities and communities participate in responding. Where feedback loops are ambiguous or delayed, empowerment remains more attenuated.

Theme D

Advocacy and Media Engagement

ADVOCACY IS A CENTRAL STRATEGY ACROSS ALL CBM PROGRAMMES, transforming community data into public and institutional pressure for accountability, though it varies from active to aspirational.

Based on the FGD, **advocacy emerges as a central strategy** across all programmes, reflecting a shared recognition that **community data collection alone is insufficient—evidence must be transformed into public and institutional pressure for change to happen**. **In Lebanon**, the programme explicitly combines digital monitoring with **social media outreach**, posting major violations to mobilize community action. **In Myanmar**, KESAN anticipates using KERBWA data on **illegal logging and mining hotspots**, consolidated into maps and analytical summaries, to supply regional and international media outlets that seek verified information from conflict-affected areas. **In Cambodia**, respondents stressed that securing government recognition and acceptance of community-generated data is key to meaningful uptake, suggesting that **annual national consultations involving communities and youth could strengthen dialogue with authorities**.

Across all programmes, **advocacy is recognized as the bridge between evidence and institutional accountability**. Yet variation persists: in some contexts, advocacy is already active, while in others it remains aspirational; media attention sometimes translates into change, but in other cases it exposes communities to new risks.

Current Advocacy Use of CBM Data

25% ★★★★★
50% ★★★★☆
25% ★★★☆☆

SURVEY SHOWS UNEVEN BUT PROMISING CBM data use in advocacy

Survey results reveal uneven but promising use of CBM data in advocacy: **two respondents (25%) rated 5, four (50%) rated 4, and two (25%) rated 3**.

Lebanon stands out for **actively integrating monitoring into campaigns**, with violations **posted on social media** to mobilize public action and pressure institutions. **Myanmar** is building credibility by **consolidating KERBWA data into maps and summaries** for regional and international media, **positioning CBM as a trusted source** from conflict-affected areas though still in early stages.

Cambodia stated that **monitors regularly uploaded photos and GPS evidence** that NGOs and journalists verified, **leading to news reports and campaigns that pressured authorities**.

This variation shows that while **advocacy is widely recognized as essential**, programmes differ in how far they have moved from intention to practice, with **Lebanon demonstrating direct mobilization** and **Myanmar and Cambodia building external channels**.

Potential for Future Advocacy

50% ★★★★★
50% ★★★★☆

When asked about the potential to use CBM data for future advocacy, responses were substantially more optimistic: **four respondents (50%) reported strong potential (score 5), and four (50%) reported moderate-to-strong potential (score 4). Every respondent rated future advocacy at 4 or above, contrasting sharply with moderate current scores**. **Lebanon stated:** "Our advocacy towards protecting preserving and restoring Lebanon's biodiversity is fuelled with CBM reporting." **Myanmar framed advocacy as foundational:** "Data supports advocacy for community rights and the future establishment of federal democratic governance." Advocacy is not merely a communication tactic but a governance strategy. **Cambodia emphasized:** "Increasing credibility of data as key to government acceptance. Annual national consultations involving communities and youth would support data sharing and dialogue with authorities." At the same time, respondents stressed that formal government recognition and acceptance of community-generated data is equally essential so that credible data can actually influence decisions. Hence, advocacy potential depends on bridging credibility gaps and political will of the authorities to accept community-generated data and create spaces for dialogue. **Kenya articulated potential in policy terms:** "The CBM Data will be used to influence policy for community participation."

The unanimous optimism about future advocacy suggests programmes see advocacy as the critical next frontier—a domain where CBM could operate more effectively if institutional and communication barriers are addressed.

Media Attention and Coverage

37.5% ★★★★★
37.5% ★★★★☆
12.5% ★★★☆☆
12.5% ★★☆☆☆

CBM'S MEDIA IMPACT SPLITS BETWEEN STRONG AND MODERATE driven by strategic bridges to journalists/ NGOs rather than data alone.

Survey results on CBM's contribution to media attention show a split pattern: **three respondents (37.5%) reported strong impact (score 5), three (37.5%) moderate (score 4), one (12.5%) limited (score 3), and one (12.5%) minimal (score 2).** This clustering at both high and moderate levels suggests that while some programmes have successfully leveraged CBM for visibility, others are still at early stages of app development. **Lebanon reported the strongest impact**, with the Green Rangers project **combining digital monitoring and social media advocacy. Major violations are posted online to mobilize public action, turning CBM data into visible campaigns** that attract national attention. **Cambodia** also demonstrated how CBM can reach the media: **data from the Prey Lang App,** including photos and GPS evidence, has been verified by NGOs and journalists and **featured in hundreds of news reports and advocacy campaigns**, showing how systematic documentation can translate into coverage.

Other programmes reported more modest scores, reflecting contexts where CBM data has yet to be systematically collected. The variation highlights that **media attention depends less on the existence of credible data than on deliberate strategies to connect monitoring results with journalists, NGOs, and public platforms**. Where those bridges are built, CBM becomes a force in shaping narratives of forest protection; where they are absent, data risks remaining confined to internal use.

Safety in Sharing CBM Findings Publicly

25% ★★★★★
75% ★★★☆☆

CBM SAFETY SCORES ARE CAUTIOUSLY MODERATE with anonymity, intermediaries, and credibility as key protections amid ongoing retaliation risks.

Survey results show a cautious picture: the **two respondents (25%) from Lebanon reported very high safety (score 5), while six (75%) reported moderate safety (score 3)**. **No respondent rated safety as low**, but the predominance of mid-range scores suggests that protections exist yet concerns remain. **Lebanon** reported the strongest sense of safety, emphasizing **anonymity features in the app** that **hide personal data** due to conflict sensitivity and **Do No Harm principles**. This design encourages reporting by reducing fear of retaliation. **Myanmar** highlighted the role of intermediaries: **geolocated, community-validated evidence is shared through KESAN** with regional and international media, reducing risks by ensuring sensitive information is handled by trusted partners rather than individuals directly. **Cambodia added a more complex perspective**: although **recognition by NGOs**, **media, and researchers** created a sense of protection—making community voices harder to dismiss—**government retaliation is still present, leaving forest monitors feeling insecure despite external validation**. This tension between protection and vulnerability becomes clearer when looking at concrete outcomes. I**n Cambodia**, for example, PFCN members confiscated timber from illegal loggers during a patrol and documented the case through CBM. Reported to local authorities, the timber was later repurposed—with their agreement—to build a community hall in the village. While this outcome **strengthened confidence** and demonstrated CBM's ability to deliver collective benefits, it also underscored the risks communities face when confronting powerful actors.

Taken together, these accounts suggest that safety in public sharing depends on anonymity that shields individuals, institutional intermediaries that manage exposure, and credibility that transforms communities into recognized actors. Yet the predominance of moderate scores and Cambodia's experience underline that safety is fragile, contingent on context, and vulnerable to state pushback even when external recognition is achieved.

CONCLUSION

Theme D shows that advocacy is widely recognized as the bridge between evidence and enforcement by authorities, but its practice varies across contexts.

Lebanon demonstrates how **CBM can directly fuel public mobilization**, Cambodia illustrates how systematic documentation can reach media and even deliver tangible community benefits, while Myanmar, Tanzania, and Kenya remain at earlier stages of operationalization. **Media attention is strongest where strategies connect data to journalists and public platforms, and safety in sharing depends on anonymity, intermediaries, and recognition—yet remains fragile** in authoritarian states. Taken together, the findings highlight both the promise and the precarity of CBM advocacy: it can transform monitoring into influence and collective gains when protections are sustained and channels for communication are actively built.

Additionally, successful **advocacy depends on credibility, verifiability, media relationships, and institutional coordination**—factors extending beyond the CBM programme itself into broader media ecosystems and governance systems.

Theme E

Enforcement and Impact

ENFORCEMENT IS CBM'S TOUGHEST CHALLENGE, requiring tangible results for legitimacy; successes in Lebanon contrast rejections in Cambodia and early potential in Myanmar.

Based on the FGDs, **enforcement and environmental impact emerge as the frontier where CBM programmes face their greatest challenges.** Participants stressed that **monitoring only gains legitimacy when violations are acted upon and communities see tangible results**. **In Lebanon**, respondents reported **concrete enforcement success**, with the app helping to **stop destructive activities and leading to arrests** in real time. Yet even here enforcement is not automatic—**violations are often documented after damage has occurred**, making sanctions against perpetrators and deterrence the primary value rather than prevention.

Cambodia presented a more difficult picture: **community reports are frequently rejected by authorities**, and in many cases **no action follows**. This undermines confidence and highlights the fragility of enforcement when institutional accountability is weak. **Myanmar's assessment** was cautious, noting that it is still **early to tell whether Karen National Union (KNU) authorities will fully recognize community data**, though cooperative relations suggest potential for uptake.

The pattern is clear: while some programmes demonstrate enforcement results, others face persistent resistance or insufficient follow-up. **CBM data alone does not guarantee impact**—enforcement stands as the decisive test where monitoring either translates into accountability, or risks remaining symbolic.

CBM Data Contributing to Concrete Enforcement Actions

25% ★★★★★
12.5% ★★★★☆
50% ★★★☆☆
12.5% ★★☆☆☆

CBM ENFORCEMENT OUTCOMES DIVERGE SHARPLY, with Lebanon leading via institutional ties, while Cambodia/Myanmar show moderate results amid constraints.

HAS CBM DATA FROM YOUR WORK ALREADY CONTRIBUTED TO CONCRETE ENFORCEMENT ACTIONS (e.g. fines, arrests, stopping activities)

50% ★★★★★
12.5% ★★★★☆
25% ★★★☆☆
12.5% ★★☆☆☆

When asked whether CBM data has already contributed to concrete enforcement actions—such as fines, arrests, or stopping destructive activities—responses showed clear divergence. **Two respondents (25%)** reported strong enforcement outcomes **(score 5)**, **one (12.5%)** reported moderate outcomes **(score 4)**, **four (50%)** reported limited outcomes **(score 3)**, and **one (12.5%)** reported minimal outcomes **(score 2)**. This distribution highlights that while enforcement successes exist, they are uneven and far from guaranteed.

Lebanon reported the strongest enforcement results (scores 5). One respondent noted: "From February to August, **72 violations were reported, mostly related to tree logging and forest fires**. The app has **successfully helped stop ecocide activities and led to arrests in real time**." This success depends on institutional integration: **strong relationships with local authorities**, a direct hotline, and validation of reports by TERRE Liban focal points ensure police take immediate action.

Cambodia reported moderate enforcement **(score 3)**. **Patrol records documenting repeated illegal logging** led to **joint inspections with authorities** at the local level, warnings, and enforcement orders. Yet respondents acknowledged constraints: "In the Cambodian context, normally the **data has been declined by the relevant stakeholders**...we are looking for potential partners or opportunities to present the data." Even when enforcement occurs, it remains inconsistent.

Myanmar reported moderate outcomes **(score 4)**, noting that CBM data has begun to support enforcement in conflict-affected areas, though recognition by authorities is still tentative. **Tanzania and Kenya** reported minimal outcomes **(scores 2–3)**, reflecting **early implementation stages** where monitoring is active but enforcement mechanisms are not yet established.

FIGURE 9
Karen communities mapping their territories

The critical insight is that enforcement is not an automatic product of credible monitoring data. It requires strong institutional partnerships, clear response mechanisms, and political will. Where these conditions exist—as in Lebanon—**CBM can directly trigger arrests and deterrence**. Where they are weak or contested, as in Cambodia or early-stage programmes, enforcement remains partial or lacking. This underscores that CBM's effectiveness ultimately hinges on whether authorities' institutions are willing and able to act on community evidence.

Current Openness of Authorities to Community Data

HOW WOULD YOU RATE THE CURRENT OPENNESS OF RELEVANT AUTHORITIES TO ACT ON COMMUNITY-GENERATED DATA?

50% ★★★★☆
37.5% ★★★☆☆
12.5% ★☆☆☆☆

HIGH OPENNESS

Survey results on authority openness to act on community-generated data show a mixed picture: **three respondents (37.5%) reported very high openness (score 5), four (50%) reported moderate openness (score 3) and one (12.5%) reported low openness (score 2)**. This distribution highlights both encouraging partnerships and persistent scepticism, with Lebanon and Myanmar at the high end and Cambodia and Kenya reporting limited trust.

Lebanon expressed the highest confidence, noting that **strengthened coordination between TERRE Liban, the Ministry of Agriculture, and the police operations unit has resulted in faster and more effective responses** to reported forest violations. **Myanmar** also reported strong openness **(score 5)**, framing CBM data as a foundation for future governance: **accumulated monitoring records** are expected to **support official decisions** by the Karen Forest Department and Indigenous leaders, potentially justifying zoning measures and reinforcing community rights.

FIGURE 10
Patrollers in Cambodia, testing the PL app

LOW OPENNESS

Cambodia reported lower openness **(scores 2–3)**, pointing to a **lack of trust between communities and authorities**. Even when data is accurate and systematic, **scepticism persists**, discouraging participation and limiting enforcement. **Kenya** similarly highlighted possible future reluctance rooted in power dynamics: respondents described the **Kenya Forest Service as authoritative and unwilling to delegate power**, with concerns that **government actors could even manipulate or discredit** future community data.

The findings suggest that **openness is not determined by data quality alone** but by **institutional relationships, the willingness of authorities to share power, and historical trust**. Where partnerships are formalized and authorities see CBM as complementary to their mandate—as in **Lebanon and Myanmar**—openness is high. Where distrust and power asymmetries dominate—as in Cambodia and Kenya—community evidence struggles to gain traction, underscoring that **institutional culture is more decisive than technical credibility**.

AUTHORITY OPENNESS TO CBM DATA IS MIXED hinging on institutional relationships and power sharing more than data quality.

Potential for Enforcement in the Next 3-5 Years

When asked about the potential for CBM data to support enforcement in the next 3–5 years, responses were **substantially more optimistic than current outcomes**. **Four respondents (50%) reported strong potential (score 5), three (37.5%) reported moderate-to-strong potential (scores 3–4), and one (12.5%) reported lower potential (score 3)**. This distribution highlights a clear belief that, despite present barriers, respondents see enforcement as a frontier that can be crossed with time and institutional engagement.

Lebanon expressed the highest confidence (score 5), building on already accelerating enforcement outcomes. Respondents emphasized that **strong coordination with authorities** and validated reporting mechanisms are expected to sustain and expand enforcement capacity. **Myanmar also reported strong potential (score 4)**, noting that **accumulated CBM data could support official decisions** by the Karen Forest Department and Indigenous leaders. Consistent, community-generated evidence is seen as a pathway to institutional legitimacy, making enforcement more credible and systematic.

HOW STRONG IS THE POTENTIAL FOR CBM DATA TO SUPPORT ENFORCEMENT IN THE NEXT 3-5 YEARS IN YOUR CONTEXT?

50% ★★★★☆
37.5% ★★★☆☆
12.5% ★☆☆☆☆

FIGURE 11
Authorities in Cambodia blocking PLCN members the access to their actvities

Cambodia presented a mixed picture: one respondent rated strong potential (score 5), while another rated lower (score 3). This reflects both optimism about CBM's credibility and **persistent concerns about government reluctance** to act on community data. Without stronger governance relationships, future enforcement may remain inconsistent. **Kenya and Tanzania reported moderate-to-strong potential (scores 4–5)**, suggesting confidence that as programmes mature and partnerships deepen, enforcement will become viable.

The **gap between current limited enforcement and strong future potential** reveals both optimism and fragility. Programmes believe CBM can evolve into a recognized enforcement tool, but this depends on **sustained authority openness**, institutional systems for response, and the credibility of community evidence. Importantly, **emerging global frameworks such as the IUCN Resolution 126[14,15] and the Kunming–Montreal Global Biodiversity Framework (KMGBF)[12]**, together with international institutional actors increasingly highlighting the value of CBM, can and must play a catalytic role. By **embedding CBM into international policy commitments** and signalling its legitimacy to national governments, these frameworks provide the external pressure and recognition needed to transform community monitoring into consistent enforcement and measurable impact at national level.

FUTURE CBM ENFORCEMENT POTENTIAL (3–5 YEARS) IS STRONGLY OPTIMISTIC bridging current gaps via partnerships and global frameworks, though Cambodia shows mixed views.

Environmental Harm Reduction

When asked to what extent CBM has already reduced environmental harm—such as illegal logging, forest fires, or mining—responses revealed a mixed but cautiously positive picture. **Two respondents (25%) reported strong reduction (score 5), two (25%) reported moderate-to-strong reduction (score 4), and four (50%) reported moderate outcomes (score 3)**. **No respondent rated CBM as having no impact**, suggesting that while the scale varies, all programmes see at least some evidence of harm reduction.

Lebanon reported visible impact (scores 4–5), citing that the monitoring app has **helped stop ecocide activities and led to arrests in real time**. Respondents emphasized that **violations reported through the app are validated and acted upon quickly**, which has deterred further offenses and contributed to forest protection.

Kenya's responses (scores 4–5) were framed more as aspirations for the future than evidence of current outcomes. Respondents highlighted that, once systematic data collection is underway, CBM data will be used to influence policy and strengthen community participation, but concrete reductions in harm are yet visible. **Tanzania similarly reported strong potential (score 5)**, noting that while systematic data collection has yet to begin, monitoring activities are already in place and expected to contribute to harm reduction once reporting structures are fully operational.

Cambodia presented a dual reality (scores 3). At the local level, CBM patrols have triggered tangible results: **confiscated timber has been repurposed** for community benefit, and joint inspections have led to warnings and enforcement orders. Yet at the national level, **reports are often rejected** by authorities, limiting broader impact and leaving communities vulnerable to retaliation. **Myanmar also reported moderate outcomes (score 3)**, acknowledging that CBM data has begun to expose illegal logging and mining hotspots, but enforcement remains tentative and environmental outcomes are not yet fully visible.

The findings suggest that **CBM has begun to reduce environmental harm** in certain contexts, particularly where local enforcement is responsive. However, the overall impact remains uneven. **Strong reductions are tied to institutional partnerships and rapid response mechanisms**, while aspirational or contested contexts—such as Kenya, Tanzania, and Cambodia at the national level—show that without consistent follow-up by authorities, monitoring data does not provide environmental protection. The **trajectory is promising, but fragile**, hinging on whether local successes can be scaled into sustained national enforcement.

CBM SHOWS MIXED BUT CAUTIOUSLY POSITIVE HARM REDUCTION, strongest where local enforcement responds quickly, aspirational elsewhere.

CONCLUSION

Across Theme E, enforcement and environmental impact stand out as the most critical frontier for CBM programmes.

The cases show a **sharp divergence**: Lebanon demonstrates strong enforcement outcomes, while Myanmar, Tanzania, and Kenya remain at early or aspirational stages, and Cambodia reflects a dual reality—local enforcement successes but national-level rejection. This distribution is **more uneven than in any other theme**, underscoring that enforcement is where CBM faces its **greatest implementation challenges**.

Four critical insights emerge:

- **Enforcement is not automatic from good data**. Lebanon's success rests on specific institutional conditions—direct hotlines to police, third-party validation, and formal partnerships with authorities. Where these mechanisms are absent, monitoring remains symbolic.
- **Authority openness depends on governance relationships and accountability**. Kenya's low openness reflects entrenched power dynamics and historical distrust, while Cambodia shows that even systematic and verifiable data can be dismissed when accountability is lacking.
- **Environmental harm reduction is contingent on enforcement**. Without consistent authority response, programmes can document environmental violations but not reductions in illegal logging, wild fires, or mining.
- **There is a gap between current outcomes and perceived future potential**. Respondents are optimistic about the next 3–5 years, but aware of the current lack of enforcement. Bridging this gap requires sustained institutional integration, partnerships with authorities, and national implementation of global agreements such as the IUCN Resolution 12614,15 and the Kunming–Montreal Global Biodiversity Framework[12].

In perspective, Theme E shows that CBM has begun to deliver enforcement and harm reduction in some contexts, but its effectiveness remains uneven. The pathway from monitoring to enforcement to impact is incomplete; only where institutional systems, trust, and political will converge can CBM evolve from documenting violations into a driver of accountability and environmental protection.

Theme F

Challenges in CBM Implementation

Challenges reported across contexts reveal that CBM programmes face systemic constraints that **limit their ability to move from credible monitoring to sustained enforcement and impact**. These challenges span financial sustainability, technical capacity, safety, trust, and motivation, with each country highlighting a different critical barrier.

Financial Sustainability and Long-Term Continuity

Funding insecurity and sustainability after project cycles were consistently rated as strong challenges. **Tanzania identified sustainability after funding ends as its most pressing issue**, while **Lebanon and Myanmar emphasized the difficulty of securing long-term resources** to maintain patrols, staff, and consultations. Myanmar's account was particularly detailed: **without predictable support for patrols, safety measures, and FPIC processes**, CBM in conflict-affected areas cannot be sustained. This convergence shows that **CBM's durability depends on embedding financial support into institutional systems rather than relying on short-term donor projects**.

Technical Capacity and Data Quality

Technical capacity (IT, data management) was generally rated as a moderate challenge (scores clustered around 3), reflecting that while communities face gaps in training and infrastructure, these are not seen as insurmountable. However, maintaining data quality and validation was rated much higher, with three-quarters of respondents identifying it as a strong challenge. **Kenya emphasized that validation is essential to prevent manipulation or misuse of data**, while **Lebanon noted that institutionalizing CBM requires systematic verification by field officers**. This distinction suggests that while basic technical skills can be built, **credibility hinges on robust validation systems**.

Literacy and Accessibility

Low digital literacy was reported as a moderate challenge in Cambodia and Lebanon, requiring app designs that prioritize offline functionality, icons, audio, and indigenous terminology. These adaptations show that technical barriers can be mitigated, but they r**emain significant for scaling CBM across diverse communities**.

Safety and Security Risks

Safety concerns were rated high in Myanmar, Lebanon, and Cambodia. Myanmar noted that rangers must take **longer, less direct patrol routes** due to security risks, while **Cambodia emphasized retaliation against monitors**. Lebanon's Green Rangers app addressed this through anonymity features, but **risks persist even with protective design**.

Trust and Institutional Relationships

Cambodia identified lack of trust between communities and authorities as its most critical challenge. Even when data is accurate and detailed, **authorities may be sceptical or slow to act, discouraging participation**. **Kenya** echoed this dynamic, **pointing to historical distrust** with the Kenya Forest Service. While respondents framed this as "lack of trust," the underlying issue may be more fundamental: **where authorities are complicit in environmental violations or embedded in extractive networks, refusal to act reflects not scepticism but active resistance to accountability**. This shows that institutional culture and power dynamics, not data quality, often determine whether CBM evidence is acted upon.

Time and Motivation

This challenge was rated strongest in Kenya and moderately high in the other contexts. Respondents highlighted that **community members juggle multiple responsibilities and often lack incentives** to sustain monitoring. **Without visible enforcement or feedback loops, motivation declines sharply**.

CONCLUSION

Theme F reveals that CBM challenges are moderate to high across most dimensions, but with distinct peaks depending on context.

Financial sustainability and long-term continuity dominate across all countries, while **Kenya stands out for the acute challenge of limited time and motivation**. **Technical capacity is moderate**, but **data quality and validation are consistently rated high**, reflecting the importance of credibility. **Safety risks and lack of trust remain significant barriers**, particularly in Cambodia and Myanmar.

The open-ended responses sharpen the challenges:

- **Lebanon and Myanmar: sustaining teams and patrols through predictable funding.**
- **Kenya: ensuring data quality and addressing motivation gaps.**
- **Cambodia: overcoming distrust and inconsistent authority follow-up.**
- **Tanzania: securing sustainability beyond project cycles.**

The overall pattern is clear: **CBM's promise is constrained not by lack of community engagement but by systemic barriers in governance, financing, and institutional trust.** Addressing these **requires long-term investment**, **robust validation mechanisms, and protective frameworks** for monitors. Without tackling these challenges, CBM **risks remaining fragile**—effective in pockets, but **unable to scale** into a durable mechanism for accountability and environmental protection.

5. THEMATIC SYNTHESIS: ANSWERING THE CORE AIMS

This chapter synthesises key insights from the partner questionnaires and focus group discussions to directly address the five analytical aims established in the introduction.

The synthesis distils **cross-cutting patterns** and demonstrates how **technical practices (tools, workflows), governance arrangements (data control, authority relations), social dynamics (empowerment effects), and external strategies (advocacy pathways)** interact to position communities as active agents in biodiversity conservation and policy processes.

5.1. DIGITAL TOOLS, DATA GOVERNANCE, AND EVIDENCE AUTHORITY

Data governance determines who controls evidence and gains authority in environmental decisions, with three distinct approaches emerging across contexts. Community autonomy preserves full control to avoid co-optation (Cambodia), co-governance builds authority partnerships from the start (Myanmar), and complementary models use trusted organizations to validate and channel data to enforcement authorities (Lebanon). These strategies succeed when they match local political realities navigating the critical tension between gaining institutional recognition for enforcement and protecting communities from retaliation or persecution by those threatened by the evidence.

Timing of authority engagement is the strategic crux: early collaboration speeds action where governments are open but weak (Lebanon), independence preserves leverage for international pressure where space shrinks (Cambodia), and shared governance builds future-ready structures where the state remains contested (Myanmar). State enforcement isn't the only path—when domestic channels fail, data sovereignty opens alternative routes through international recognition, media pressure, and civil society networks, creating protection and future options even when local authorities block formal access.

Civil society partners serve as trusted intermediaries, handling technical complexity while communities retain final say over data use and access. They validate evidence, protect monitors through anonymization, and bridge to institutions—essential support, not control. Programs must balance open data standards (FAIR) against community rights (CARE); too much openness risks compromising sovereignty, too much data protection limits policy impact. The optimal approach depends on whether national systems respect community rights.

This reveals a stark policy-practice gap: GBF[9,10] and IUCN Resolution 126[14,15] promise community data will shape biodiversity targets, yet governments vary widely—some reject evidence, strip cultural context through standardization, or treat environmental monitoring as political opposition (Cambodia). Practical solutions include recognizing diverse governance models in National Biodiversity Strategies, creating direct community pathways to global reporting when national systems fail, and building capacity for community-led validation and review boards. Ultimately, data sovereignty is about power: who defines credible evidence and whose priorities shape monitoring, making governance core to CBM design.

5.2. EMPOWERMENT, INTERNAL ORGANISATION, AND AGENCY

Community-based monitoring transforms who holds voice in environmental decisions, creating structured participation beyond individual outspokenness. Across contexts, formal patrol teams and review boards gave structure to information collection and discussion rather than leaving it to a few voices (Cambodia, Myanmar). Women bring everyday expertise as primary users of forest products, becoming key reporters making their knowledge visible (Lebanon, Cambodia, Myanmar).

This empowerment creates an agency flywheel: technical success → visible outcomes → more participation → stronger evidence → bolder action. Real-time arrests of offenders and confiscated timber, built confidence cycles in Lebanon, while data champions and patrol captains became community institutions that outlive funding across contexts. The epistemic shift is profound: communities move from storytelling to georeferenced reports, gaining authority as evidence producers. This confidence to speak up emerges from three reinforcing mechanisms: **technical protections** (anonymity in Lebanon, digital security in Cambodia/Myanmar), **recognition as legitimate knowledge holders through structured roles, and evidence of institutional receptiveness** (Lebanon's arrests vs. Cambodia's rejection shaping motivation).

Simple design choices enable broad participation: offline functionality, icons, audio, and local languages remove barriers for low-literacy and older participants. These features directly support empowerment by matching community expertise across all contexts. Questionnaire findings respond to GBF Target 23's inclusion call but deliver structural agency—women and youth aren't just participating; they're defining categories and serving on governance boards.

Sustainability emerges through institutionalization: review boards, patrol teams, and data champions become community infrastructure. *Intergenerational design* ensures youth become leaders while women's authority creates role models. This structural empowerment builds governance institutions where marginalized voices exercise real decision authority, creating self-reinforcing cycles of confidence and collective action.

5.3. ADVOCACY, MEDIA STRATEGIES, AND POLICY BARRIERS

CBM turns communities into advocates —but only when data reaches **receptive audiences**. Lebanon demonstrates this clearly: violations reported through the app trigger **real-time arrests** via a direct police hotline, creating immediate enforcement momentum. In contrast, Cambodia reveals the risks of rejection: even l**arge, validated datasets** are often **ignored by authorities** due to their complicity in environmental crimes, highlighting how **corruption and state capture may reject evidence that does not suit their ends**.

Three distinct pathways emerge from the findings across contexts. **Local enforcement** succeeds where governments welcome community capacity support, as seen in **Lebanon's** effective police collaboration. **International legitimacy** provides leverage when domestic channels close—**Cambodia's** UN awards and COP presentations generate external pressure while protecting monitors from retaliation. **Future governance integration** builds foundations in transitional political systems like **Myanmar**, where KERBWA data is expected to inform Karen Forest Department decisions and Indigenous territorial governance over time.

Impact depends more on an enabling environment than data quality alone. Even high-quality, georeferenced evidence requires receptive institutions to translate into action. Gatekeeping, corruption, and trust deficits remain the primary barriers regardless of technical excellence. **Feedback loops** determine sustainability—Lebanon builds confidence through visible arrests while Cambodia breeds cynicism when reports are rejected. Structural barriers persist across contexts: absent national data platforms, forest service fearing encroachment, and political risks to monitors undermine even the strongest evidence across all contexts.

5.4. SUSTAINABILITY, EFFECTIVENESS, AND CROSS-CONTEXT LESSONS

Community-based monitoring endures through self-reinforcing feedback cycles like Lebanon's, but collapses without tangible results. More than a decade of Cambodia's rigorous, georeferenced data and international recognition yielded limited local enforcement by authorities. However, the increased number of entries in 2024 demonstrates a continued high level of motivation.

Even high-quality, georeferenced evidence requires receptive institutions to translate into action—gatekeeping, corruption, and turf conflicts remain the primary barriers regardless of technical excellence. Simple design choices underpin inclusive and sustainable participation. Offline functionality, icon-based interfaces, audio, and local languages enable low-literacy users, older women, and youth to adopt tools effectively—Tanzania's Swahili interface and Cambodia's experience with older women using apps alongside men are concrete examples.

Feedback loops and intermediaries ensure continued development. Across contexts, respondents stressed that "***data must bring clear benefits***" or volunteer motivation fades, echoing Tanzania's emphasis that enforcement or livelihood gains are essential for participation to last. Lebanon's visible "see arrest leads to more reports" dynamic contrasts with settings where reports are ignored. Civil society organizations play a pivotal role by validating data, managing political risk, and providing technical support so that community-generated evidence becomes legible and usable for institutions. Together, these experiences show that long-term sustainability depends less on perfecting digital tools and more on aligning CBM design with political realities, working with institutions and use of windows of opportunity, and ensuring communities regularly see concrete results from their monitoring efforts.

5.5. ALIGNMENT OF DANMISSION'S CBM APPROACH WITH GLOBAL BIODIVERSITY GOVERNANCE COMMITMENTS

Kunming-Montreal Global Biodiversity Framework (GBF)

Danmission's CBM initiatives reflect the GBF's emphasis on community-generated knowledge, rights based participation, and inclusive governance. The most mature programmes—Cambodia, Lebanon, and Myanmar—demonstrate how community led monitoring systems can generate credible data and influence governance processes, while emerging initiatives in Tanzania and Kenya show how these principles are being integrated into new designs.

Target 20 — Capacity-building, technology transfer, and cooperation

Danmission's CBM work advances this target through **participatory app design, peer learning, and long-term technical accompaniment**, ensuring that digital tools are co-created rather than externally imposed. Cambodia's decade of iterative development and the Cambodia–Myanmar exchanges illustrate how **capacity-building becomes embedded in community practice**, enabling communities in generating and interpreting environmental data autonomously. Lebanon's Green Rangers model similarly strengthens citizen capacity through training in reporting, verification, and environmental law. Tanzania's early design workshops, which brought communities, cooperatives, and government actors together, already reflect this participatory ethos, while Kenya's design phase is intentionally structured to incorporate these lessons from the outset.

Target 21 — Knowledge accessibility and use in decision-making

Across Cambodia, Lebanon, and Myanmar, partners transform raw observations into **structured, accessible knowledge products** that authorities and communities can act upon. Forestry networks' quarterly reports in Cambodia, Lebanon's validated submissions to the Internal Security Forces, and Myanmar's emerging Indigenous data governance structures all demonstrate how **community-generated evidence becomes actionable** in enforcement, advocacy, and policy dialogue. Tanzania is building its monitoring system with the explicit aim of producing community-controlled dashboards and reports, and Kenya's future framework is being designed to ensure that community data will feed into harmonised decision-support systems.

Target 22 — Participation, rights, and access to environmental information

Danmission's CBM approach operationalises this target by creating **continuous, community-led participation mechanisms**. In Cambodia, PLCN's monitoring positioned communities as evidence providers in national and international debates; in Lebanon, the Green Rangers model institutionalised citizen participation in enforcement pathways; and in Myanmar, Indigenous governance structures ensure that monitoring priorities and data use are determined by communities themselves. Tanzania's co-design process, which centres community priorities and data sovereignty, already aligns with this rights-based approach, while Kenya's stakeholder mapping and indicator selection processes are being built to institutionalise participation from the beginning.

Target 23 — Gender equality and social inclusion

The programme contributes to this target by ensuring that women and youth are **central actors in monitoring, reporting, and governance**. Women patrollers in Cambodia, women reporters and youth climate activists in Lebanon, and women researchers in the Karen review structures demonstrate how CBM can redistribute authority and visibility within communities. Tanzania's introductory workshops deliberately included women's groups and youth cooperatives, ensuring that the emerging system reflects inclusive governance. Kenya's design phase similarly prioritises the involvement of women and youth as future custodians of mangrove ecosystems, embedding gender-responsive principles before monitoring begins.

IUCN Resolution 126 on Citizen and Community Science

Resolution 126 calls for mainstreaming citizen and community science across conservation practice, recognising community-generated data as legitimate and emphasising long-term support and protection. Danmission's CBM programme embodies these expectations through its rights-based design, sustained partnerships, and emphasis on community authority, with Tanzania and Kenya integrating these principles into their emerging systems.

Mainstreaming community science through structured strategies and action plans

Danmission's multi-country CBM portfolio functions as a de facto strategy for citizen community science, characterised by **shared methodologies, participatory design principles, and iterative learning across contexts**.

Cambodia's long-term model and Myanmar's participatory design process exemplify how structured approaches can take root in very different governance environments. Tanzania's early workshops and Kenya's structured design roadmap show how mainstreaming begins even before monitoring becomes operational, embedding CBM principles into institutional planning.

Recognition of community-generated data as legitimate evidence

The programme strengthens the legitimacy of community evidence through **geo-referenced documentation, verification protocols, and public reporting mechanisms**. PLCN's datasets gained international recognition and influenced global debates; Lebanon's validated reports feed directly into enforcement systems; and Myanmar's governance structures are designed to ensure that Indigenous data is recognised and protected. Tanzania's planned workflows—community validation, structured reporting, and transparent data governance—are being built to ensure that future data will be credible and policy-relevant, while Kenya's harmonised framework aims to standardise community evidence across multiple actors.

Long-term support, capacity-building, and protection of environmental defenders

Danmission's partnerships provide sustained technical, organisational, and safety support, particularly in high-risk contexts. Digital security training in Cambodia, careful field protocols in Myanmar, and anonymity mechanisms in Lebanon demonstrate a commitment to **protecting community monitors and environmental defenders**, a core requirement of the resolution. Tanzania's early emphasis on data sovereignty and responsible monitoring practices shows how protection is being integrated into system design, and Kenya's future framework is being shaped with similar safeguards in mind.

Ensuring meaningful voice and leadership for Indigenous Peoples and local communities

The IUCN resolution emphasises that those most affected by conservation decisions must shape priorities and outcomes. Danmission's CBM work embodies this principle by ensuring that communities **define monitoring agendas, govern data, and participate in decision-making structures**. The Karen governance model in Myanmar and the community-led monitoring priorities in Cambodia and Lebanon show how CBM can reinforce local authority. Tanzania's co-design process and Kenya's participatory indicator selection demonstrate how emerging systems are being built to embed community leadership from the outset.

6. RECOMMENDATIONS

The cross-country analysis, focus group discussion, and survey findings reveal a set of structural conditions that determine whether community-based monitoring (CBM) can meaningfully influence environmental governance. While contexts differ, the evidence points to shared priorities that Danmission and its partners can address to strengthen CBM practice, enhance data credibility, and ensure that community-generated evidence becomes a recognised input in policy and enforcement processes.

FIRST PRIORITY

Ensuring the safety of community members and the sustainability of CBM programmes. This should be achieved in the following ways:

- **Enhancing safety andprotection for community monitors** by maintaining anonymity features in all monitoring tools, developing context-specific safety protocols for patrols and reporting and advocating for legal and institutional protections for community monitors.
- **Ensuring funding, capacity, and local expertise** by investing in local technical capacity for data management and system maintenance, developing multi-year funding strategies that include patrol stipends and equipment renewal and linking CBM to livelihood opportunities (e.g., eco-tourism, restoration, NTFP value chains).
- **Embedding gender equality and youth leadership** in all CBM Processes by formalising roles for women and youth in governance, validation, and advocacy and supporting youth-led outreach, digital literacy, and environmental leadership initiatives.
- **Establishing feedback mechanisms** so communities see concrete results from their monitoring efforts, maintaining trust and motivation over time.

SECOND PRIORITY

Establishment of new CBM programmes should be done in such a way, that the programmes usefulness for advocating for community rights is maximized. This should be achieved in the following ways:

- **Strengthening community ownership and governance structures of data collection and use,** ensuring monitoring systems embed indigenous and local knowledge in categories, indicators, and data governance protocols, upholding Indigenous data sovereignty.
- **Strengthening data credibility, validation, and actionability** through development of validation protocols that include community verification, establishment of feedback loops that show communities how authorities respond to their reports, and community-facing dashboards and periodic reports to support local interpretation.
- **Building more strategic and trust-based relationships** with authorities by co-developing reporting and response protocols with relevant authorities, organizing regular consultations where communities present CBM findings, supporting communities with negotiation, communication, and advocacy skills, and facilitating joint reviews of monitoring results.
- **Strengthening advocacy pathways and media engagement** by developing advocacy toolkits that translate CBM data into maps, infographics, and briefs, building coalitions with national and regional organisations to amplify CBM findings, and promoting CBM as a legitimate data source in biodiversity and climate reporting frameworks.

THIRD PRIORITY

Utilizing Danmission's expanding CBM portfolio to advocate for the inclusion of local voices in international biodiversity and natural resource initiatives. This should be achieved in the following ways:

- **Harmonising and standardising CBM approaches across countries** through the development of a Danmission CBM framework outlining minimum standards for governance, validation, safety, and reporting.
- **Creating a cross-country learning platform for partners** to exchange tools and innovations and documentation and dissemination of lessons learned from mature programmes to guide emerging ones.
- **Positioning Danmission as a leader in community-generated biodiversity data** by engaging in global biodiversity forums to advocate for CBM recognition, producing policy briefs demonstrating how CBM contributes to GBF targets, and collaborating with research institutions to analyse CBM datasets and publish findings.
- **Setting a strategic goal for 2031: full recognition of community data in policy processes** by developing a roadmap for integrating CBM data into national reporting systems (NBSAPs, forest inventories, climate adaptation plans) and supporting pilot data-sharing agreements with authorities.

The evidence across all five countries shows that **community-based monitoring** is not simply a method for collecting environmental data—**it is a governance practice that redistributes authority, strengthens community agency, and creates new pathways for accountability. When communities lead monitoring, when data is credible and protected, and when authorities recognise its value, CBM becomes a catalyst for more inclusive and rights-based environmental governance**. The next phase of Danmission's work offers an opportunity to consolidate these gains, support emerging programmes to mature, and position community-generated data as an indispensable component of biodiversity action by 2030 and beyond.

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