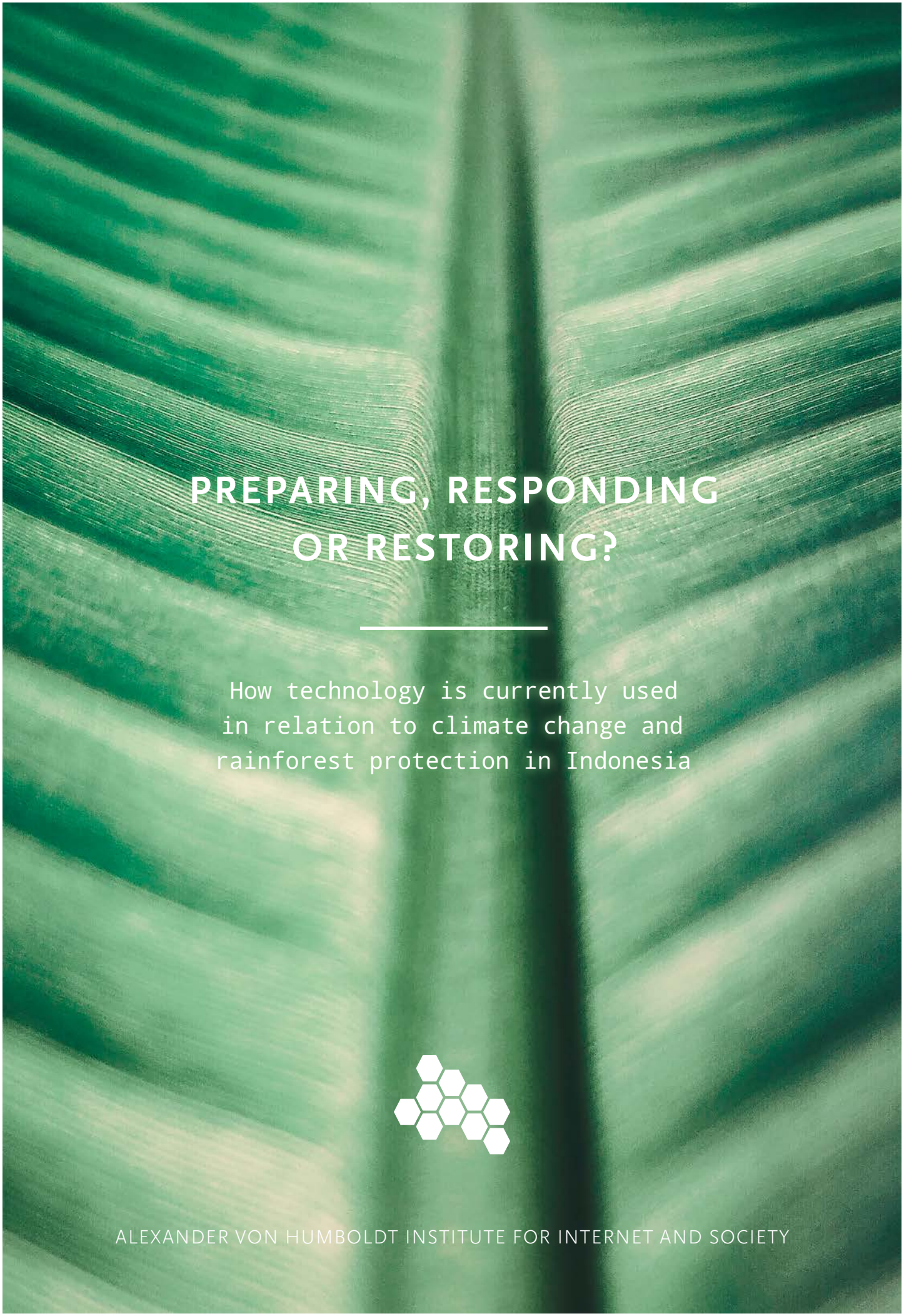

PREPARING, RESPONDING OR RESTORING?

How technology is currently used in relation to climate change and rainforest protection in Indonesia

ALEXANDER VON HUMBOLDT INSTITUTE FOR INTERNET AND SOCIETY

PREPARING, RESPONDING OR RESTORING? HOW TECHNOLOGY IS CURRENTLY USED IN RELATION TO CLIMATE CHANGE AND RAINFOREST PROTECTION IN INDONESIA

STUDY

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EXECUTIVE SUMMARY

This working paper explores the climate change – technology – rainforest protection nexus. Specifically, it looks at how technology is (and can be) used to support three aspects of rainforest resilience: preparing for protection, responding to disturbances and restoring and revitalising rainforests. It was conducted on behalf of the Humboldt Institute for Internet and Society as part of its Sustainability, Entrepreneurship and Global Digital Transformation project.

The paper's objective is to stimulate further thinking and action on the role of technology in protecting Indonesia's rainforests by providing a high-level overview of the subject area. The paper brings together (academic) literature on climate change, technology and rainforest protection with insights from professionals from different fields and sectors working on rainforest protection in Indonesia. To achieve this, a rigorous six-step approach was followed, consisting of an initial structured literature review, stakeholder mapping, key informant interviews, acquiring feedback on initial findings, and a further literature review before incorporating further feedback into the final working paper. Literature and key informant interviewers were coded and analysed using MAXQDA to support a rigorous process.

Protecting rainforests is imperative given the key role they play in sequestering carbon and decelerating climate change, hence its inclusion as Sustainable Development Goal 15 which seeks to protect, restore and promote the sustainable use of terrestrial ecosystems, including forests. Moreover, rainforests provide key ecosystem services. Deforestation and degradation of rainforests is nonetheless an ongoing global problem. There have been attempts to halt this by incentivising rainforest protection through the Reducing Emissions from Deforestation and forest Degradation framework and Voluntary Carbon Markets. However, these have had mixed success and the costs and benefits of (not) protecting rainforests are unevenly distributed, making it complex to develop successful solutions.

Indonesia is home to the third largest rainforests in the world and tens of millions of Indonesians depend on rainforests for their livelihoods and utilise its wider ecosystem services. However, like elsewhere, Indonesian rainforests are constantly under threat from climate change, but also from the conversion of rainforests to land uses – particularly palm oil – that deliver more immediate and tangible benefits.

TECHNOLOGY, HOWEVER, DOES NOT OPERATE IN ISOLATION. IT IS ESSENTIAL TO UNDERSTAND HOW PEOPLE INTERACT WITH IT AND HOW THIS IS SHAPED BY INDONESIA'S SPECIFIC CONTEXT

Technology plays a key role in transitioning to a more sustainable future and is a broad term. It encompasses simple digitisation of pen and paper data collection tools as well as the use of satellite imagery and specialised soft- and hardware. Technology, however, does not operate in isolation. It is essential to understand how people interact with it and how this is shaped by Indonesia's specific context. To explore technology's role in rainforest protection, this study looks at three elements of resilience: 1) how to prepare for disruptions to rainforests, 2) how to respond to these disturbances, and 3) how to support the restoration or revitalisation of rainforests.

PREPARING FOR RAINFOREST PROTECTION

When it comes to preparing for disruptions, a lot of emphasis in the literature and interviews was on the monitoring of what happens in and around rainforests. Key technologies used for this are standardised digital data collection tools, acoustic monitoring and camera traps, remote sensing and drones, and geo-tracking. Using technology for preparedness is important because it is much more (cost-) effective to prevent disturbances than to respond to and recover from them. Satellite technology in particular has made monitoring rainforest cover much more effective and affordable. The emphasis of monitoring technology is on immediate disturbances to rainforests rather than long-term disturbances such as climate change. However, not all local-level actors involved in rainforest protection have the capacity to use all the technology that is available, so there are concerns around the accessibility of information. A gap remains between what is possible to support preparedness in theory and what technology is widely used in practice. Further compounding the difficulties in moving from information to action is that there are many actors involved in responding to disturbances, and it can be challenging to respond timely and effectively to identified disturbances.

A GAP REMAINS BETWEEN WHAT IS POSSIBLE TO SUPPORT PREPAREDNESS IN THEORY AND WHAT TECHNOLOGY IS WIDELY USED IN PRACTICE

RESPONDING TO DISTURBANCES

Key technologies used to respond to disturbances to rainforests are acoustic monitoring, drones and remote sensing and geo-tracking. These technologies enable more effective responses by informing responders in real-time about where the disturbance takes place. Acoustic monitoring and remote sensing technology can automatically alert designated contacts about events that need closer inspection. A challenge across all these technologies is that, especially in very remote areas, it can be difficult for people to act quickly on identified disturbances, so the effectiveness of technology is constrained due to the physical environment. Furthermore, not all (local level) stakeholders have the capacity to effectively utilise the available new technology and respond accordingly, and more time is needed for technology to 'trickle down' and become widely adopted. In parallel to reactive challenges, there are also proactive opportunities. Technology like geo-tracking offers an opportunity to verify the origin of products and thus a way to prove that they do not originate from protected forests. There is thus a situation whereby responding to disturbances is both reactive (responding to alerts) and proactive (creating incentives to help reduce the number of disturbances).

RESTORING AND REVITALISING RAINFORESTS

The use of technology for the restoration and revitalisation of rainforests appears to still be in its infancy, with remote sensing and drones being identified as the most promising technology. Remote sensing can help to identify the most effective places for restoring or replanting of rainforest. Not all (rain)forests are the same in terms of their ability to sequester carbon, so identifying the best areas for restoration can be important in a context with limited resources and competing priorities. Drones have been used to disperse seeds, contributing to forest (re)growth, though there

are concerns about the scalability of this approach. Moreover, given the importance of providing sufficient economic incentives to the right stakeholders to protect rainforests, technology can also be helpful in bringing down the costs for restoration and revitalisation.

LOOKING FORWARD: USING TECHNOLOGY FOR RAINFOREST PROTECTION

It is recommended that further research is carried out into the climate change – technology – rainforest protection nexus by both academic- and practice-oriented stakeholders. It is essential to conduct more research on how climate change affects the health and resilience of rainforests, and what technology can do to protect this. Likewise, it is important to better understand how people living in and with rainforests can be more actively involved in rainforest protection, how the gap between availability and accessibility of data can be reduced, and what scope there is for technology to contribute more directly to the restoration and revitalisation of Indonesia's rainforests.

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ABOUT THE PROJECT

Funded by the Gesellschaft für internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), the Sustainability, Entrepreneurship and Global Digital Transformation (SET) research project has the goal of addressing issues relating to digitalisation, particularly in the Global South. With a focus on the topics of entrepreneurship, platform regulation, and the use of digitalisation for climate resiliency, the project collaborates closely with local stakeholders to build application-oriented expertise and to create an international knowledge community.

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