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CONFRONTING CLIMATE CHANGE IN THE MARGINS: AN ETHNOGRAPHIC EXPLORATION OF LOCAL RESILIENCE STRATEGIES

ENFRENTANDO AS ALTERAÇÕES CLIMÁTICAS NAS MARGENS - UMA EXPLORAÇÃO ETNOGRÁFICA DAS ESTRATÉGIAS LOCAIS DE RESILIÊNCIA

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Abstract: The urgency of preparing for the effects of climate change is no longer in doubt and consequently political programmes worldwide are introducing measures to encourage adaptation and build resilience. However, the everyday strategies that people away from the centres are developing in order to prepare for and deal with climate change remain far less visible. These strategies have great potential because they are locally embedded and adapted to local logics, they are historically developed and thus tried and tested, and they are holistic in the sense that they address the multiplicity of entangled obstacles that extend beyond climate change. This article presents examples of local resilience strategies and offers an initial systematisation of their multidimensionality.

Keywords: climate Change; Local Resilience; Amazônia; Colombian Caribbean; Mozambique.

Resumo: A urgência da preparação para os efeitos das mudanças climáticas não está mais em questão e consequentemente, programas políticos a nível mundial promovem medidas de adaptação e resiliência. Entretanto, muito menos visíveis são as estratégias cotidianas que as pessoas fora dos centros desenvolvem para se preparar e lidar com as mudanças climáticas. Essas estratégias têm grande potencial por serem localmente incorporadas e ajustadas às lógicas locais; são historicamente desenvolvidas e, portanto, provadas; são holísticas no sentido que abordam a multiplicidade de obstáculos além das mudanças climáticas. Este artigo apresenta exemplos de estratégias de resiliência locais e provê uma sistematização inicial de sua multidimensionalidade.

Palavras-Chave: mudança climática; resiliência local; Amazônia; Caribe colombiano; Moçambique.

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INTRODUCTION

This revista's title has focused our interest on margins. Margins as the sites and spaces, the people, practices and concepts where exclusion and marginalisation manifest themselves (Naucke; Halbmayer, 2024). In these times of climate change, the margins emerge where people barely generate any emissions and yet are significantly affected. Where political, economic, social and cultural inequalities (re)produce great vulnerability. Where their own conceptions of and strategies against climate change are unable to influence political responses. Where in the worst-case scenario, local agency is jeopardised by climate change policies and green forms of extractivism. The marginality of these spaces is seldom new, but instead reflects a history of inequalities due to coloniality, gender, race and class (Ciplet *et al*., 2022; Parsons, 2023; Powys Whyte, 2017; Ribot, 2013).

Nevertheless, margins are always more than passive and vulnerable sites. They are spaces of creativity and agency, "conceptual sites where the solidity of concepts and categories disrupt and the creative potential for transformation emerges" (Naucke; Halbmayer, 2024, p. 7). Indeed, in relation to climate change, we will demonstrate in this paper that people in the margins have developed a multiplicity of responses and strategies for resilience. For researchers and politicians, these strategies may often remain invisible, as they are seldom framed as "adaptation measures" or are explicitly directed at isolated climate change effects. They are not mere reactions to a changing climate, but proactive practices performed by local actors looking to have a good life – "not simply to minimize or avert security threats, but above all to expand alternative security options and create more beneficial living conditions" (Naucke; Halbmayer, 2024, p. 14). As these local practices transcend mere adaptation, we frame them as strategies for resilience.

Resilience strategies in the margins may point to alternative pathways, often implying options for social relations and relationships with nature. Climate policy, we argue, should take note of their existence and potential, instead of counteracting them. This is particularly important as the prevailing approach to the climate crisis lacks imagination: the common emphasis is on technological innovation, while existing social conditions and the socio-economic basis for fossil fuel-based economies are rarely challenged or even addressed (e.g. Witt, 2022). In this context, local resilience strategies not only offer place-based meaningful measures, but also highlight the creative potential for transformation as they are lived examples of the "otherwise" (Mctighe; Raschig, 2019). Ignoring these local attempts would continue their marginalisation in terms of structural (Galtung, 1969), slow (Nixon, 2013), epistemic (Spivak, 1988) or other forms of violence – and represent a lost opportunity.

Our contribution thus aims to raise the visibility of such local resilience strategies, with reference to cases in Pará (Brazil), Nampula (Mozambique) and the Colombian Caribbean region. It is ethnographic in nature and primarily intends to recount stories and report on the people and their visions and practices. From a theoretical perspective, we propose an initial systematisation scheme that explores the multiple dimensions in which local resilience strategies can operate.

The argumentation is based on empirical data that were collected during ethnographic fieldwork[6] in the above-mentioned field sites during the Nisansa research project[7]. Between 2021 and 2024, we studied local responses to climate change within marginalised groups, particularly in rural communities of smallholders, Afro-descendants and indigenous groups, and local civil society initiatives. We used semi-structured and open interviews and participant observation, partly combined with social cartography (Almeida *et al*., 2018), methods of visual anthropology (CHIO, 2021) and the collaborative fieldwork of the co-authors MM[8] and JN in the Mozambican-German team. We compiled our different cases for this paper. MM, as lead author, developed its argument, which was discussed in a joint workshop in June 2024.

In order to explore local resilience strategies, we first illustrate the realities of climate change in the three study regions, highlighting the complex constellations that have to be taken into account when discussing the social implications of climate change in the margins. We then outline ethnographic examples of resilience strategies, elaborating on three dimensions: i) everyday techniques and material infrastructure, ii) knowledge dynamics and iii) collectivity and commoning. Finally, we examine the limitations of local strategies, particularly with regard to internal constraints, environmental conditions and socio-economic structural limitations.

TRACING SOCIAL REALITIES OF CLIMATE CHANGE IN PARÁ, NAMPULA AND THE COLOMBIAN CARIBBEAN

In Pará, Nampula and the Colombian Caribbean, the ecological impacts of climate change include rising temperatures and increasing droughts, intensified rainfall and an irregularity of rainy

[6] We conducted fieldwork in Nampula/Mozambique (Jemusse Ntunduatha and Michaela Meurer), Pará/Brazil (Eliana Teles and Michaela Meurer) and the Colombian Caribbean (Alexander Contreras).
[7] Information can be found at www.nisansa.org
[8] The examples presented in this paper come from our individual data collections. We indicate this by giving the abbreviations of the authors' names: Michaela Meurer (MM), Alexander Contreras (AC), Jemusse Ntunduatha (JN), Ana Salas (AS) and Eliana Teles (ET).

seasons, as well as more frequent cyclones and hurricanes in Nampula and the Colombian Caribbean. These transformations, confirmed by scientific studies undertaken by the IPCC (2014), have also been widely observed by our interlocutors. When it comes to secondary ecological impacts, the picture becomes more diverse. In Pará, for example, climate change has led to lakes drying up, which in turn has an impact on the fish population, and a reduction and change in the diversity of varieties in agriculture, especially with regard to manioc. In Nampula, climate change is reflected in soil erosion and intensifying floods. Similarly, in Colombia, floods, but also a scarcity of water and erosion along the coast are a challenge. In all cases, we note that climate change is not causing entirely new ecological events, but is exacerbating already existing ecological challenges.

However, when studying the local realities of climate change, it is much more than an ecological dimension that is at stake: we have to consider the far-reaching, complex and entangled socio-ecological dynamics caused by climate change. These socio-ecological effects are highly specific to particular locations and their socio-cultural, economic and political preconditions. Nevertheless, some general abstractions are possible, as indicated by the following quotation. When asked about local changes in the wake of the climate crisis, two fisherwomen from Abaetetuba, Pará explained some of the points of interest to them:

> For[9] the last five years or so, the rise in temperatures has directly affected our açaí production. The fruits are often not even ripe when they fall from the palm tree. [...] We are also seeing a decrease in fish. The fact that we have an industrial harbour close to the community contributes to the decrease in the territory's food security. (Dilmara Silva Araújo[10], interview ET, Abaetetuba/Pará, 2023)
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> The fishermen in the community don't catch enough fish to support their families, neither for their own consumption nor to sell it. Many of the fishermen move to other places to try and catch more fish. Sometimes they succeed; sometimes they do not, and end up losing a lot of money on the long travels. The fish in the region have become scarce, and everyone says it's the waste in the river and the heat in the water.Many fishermen end up looking for other ways to survive: some sell snacks in the city every day to support their families; others are employed by the fishermen's association or the local council, but on their days off and on Sundays they fish. The majority of the women fish for shrimp, but in recent years it has disappeared; now it's by tide and before it wasn't like that, they fished every day [...] and they fished a lot! The most significant change has been in the shallower streams, which have dried up a lot. As a result, many women no longer practise this activity (Maria Silva, interview E.T, Abaetetuba/Pará, 2023).

[9] We conducted interviews in the respective languages of the interviewees and translated quotations for this article. The same applies to quotations from secondary literature.

[10] In order to recognise the importance of local knowledge in scientific settings and as a political exercise giving a voice to the people who experience the effects of climate change in their daily lives and generate strategies to cope with them, communities demand to be recognisable in the outcome of research. For this reason, we quote those who wish it, using their real names.

The quotations are revealing because they highlight aspects that repeatedly arose within the field research in all three regions, and are also significant observations in the social science debate on climate change (e.g. Barnes; Dove, 2015): i) that the social effects of climate change are integral and far-reaching and ii) that the way and intensity with which climatic changes become challenging are directly related to local preconditions, which in our case studies often involve the presence of large-scale infrastructure projects. These points are taken up one by one in the paragraphs below.

First, it is apparent that local ecological change has far-reaching consequences on subsistence and livelihoods – as seen above with regard to food production (planting of açaí and other products or fishing activities). As this gets harder, both food security and family income are being threatened, and people are tending to diversify their activities. This regularly affects other deeper social structures and norms (Dietz *et al*., 2020). For instance, when men (temporarily) migrate, family organisation, gender roles and relations, the organisation and roles within community and so on start to transform (e.g. Ribeiro; Chaúque, 2010, 27ff.).

Second, our observation is that climate change effects are always entangled with local pre-conditions, whereas the presence of large-scale projects often increases the intensity of effects and diminishes the potential for resilience. As exemplified by the case of Abaetetuba, Pará, it is clear that fish stocks are declining due to this entanglement of conditions: climate change is leading to rising temperatures and consequently falling water levels, with water heating up more quickly, while the hydroelectric dam upriver interrupts fish migration routes and causes a decline in fish stocks. This is intensified further by the expansion of commercial fishing in the region and increasing water pollution, and exacerbated by the nearby industrial harbour (Field notes E.T, Abaetetuba/Pará, 2023). Hydropower dams in the Colombian Caribbean or the so-called Nacala corridor and its large-scale agriculture projects in Nampula create similar situations.

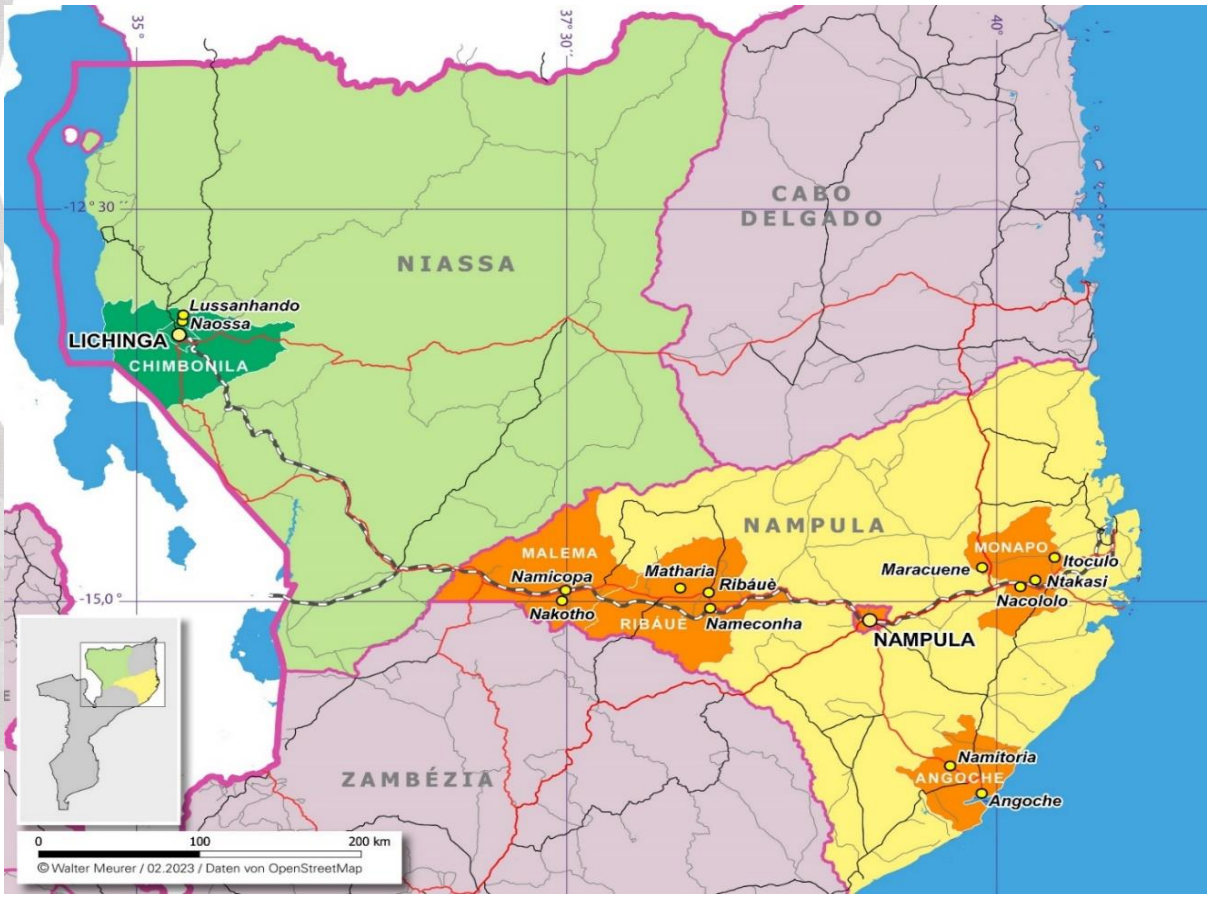
A third aspect is important: in addition to the ecological effects of climate change, climate policy and measures represent an increasing threat to local livelihoods. This is particularly visible with regard to REDD+ projects that governments and private companies are implementing in Pará and Nampula in order to generate carbon sinks (May *et al*., 2016; Sitoe *et al*., 2012). There are many examples of mitigation strategies for the international compensation of carbon emissions leading to land rights violations and restricting land access for local smallholders (Bayrak; Marafa, 2016; Bruna; Monjane, 2023). In the Colombian Caribbean, meanwhile, the global energy transition is materialising in large wind farms along the coast (Ulloa, 2023). Critics describe this kind of renewable

energy production as green extractivism. For the global energy transition and the production of green hydrogen, such forms of energy generation are becoming more important worldwide.

From a social science perspective, a fourth and final observation should be added that is related to the social production of vulnerability in the margins. Whether and to what extent climatic challenges are becoming a serious issue in relation to people's livelihoods has a large bearing on how vulnerable groups are – vulnerability is not given, but is brought about by structural inequalities and thus unevenly distributed among social groups (Ribot, 2013). On a global scale, we observe that the wealthy and powerful parts of populations succeed at self-defence by erecting border fences and signing trade agreements (Latour, 2018) so as to be able to continue an imperial mode of living (Brand; Wissen, 2017), while for others vulnerabilities are accumulating once again.

In Mozambique, for instance, these abstract observations are tangible in the effects of the increasingly regular cyclones, which cause major damage in poor urban neighbourhoods and rural areas with their precarious infrastructure and unstable housing, while economically richer areas are better equipped to resist. They reveal how climate change affects women in particular with their responsibility for daily social reproduction. They are also manifested in situations where reforestation projects undermine local resilience; projects that are modelled and implemented in favour of the centres' demand for carbon sinks, while further complicating the life of marginalised residents (Bruna; Monjane, 2023; Meque *et al*., 2023; Overbeek, 2010; Ribeiro; Chaúque, 2010).

Figure 1 - Location of the study area in the different regions of Mozambique



Author: W. Meurer (2023)

These social groups are not vulnerable *per se*, but social economic inequalities (frequently paired with racial inequality), gender imbalances and solidified dependencies in a (post)colonial and capitalist global system constantly reproduce conditions of vulnerability (e.g. Ribot, 2014; Thomas *et al*., 2019). As such, they further lead to a highly uneven distribution of climate change effects and resilience potential or, as outlined in this paper, to a reproduction and intensification of the margins.

It is these margins of climate change – its sites, actors and practices – that were the focus of our empirical research. We worked with local rural communities and initiatives, namely fishing communities and *ribeirinhos* (populations along Amazonas tributaries), smallholders, Afro-descendants and indigenous groups. We consider them to constitute margins in times of climate change – understood by Philipp Naucke and Ernst Halbmayer (2024) as *socio-spatial* and *conceptual* sites.

These groups are found in marginalised *spatial* sites, i.e. in provinces and regions far away from national or global centres, with a poorer infrastructure, weak economic conditions and a large amount of natural resources extracted by external actors at the expense of local living conditions. They live in places where the effects of climate change are being felt intensely and in rural areas with precarious infrastructures.

The groups also constitute *social* margins, with ethnic minorities or socially stigmatised or disfavoured groups, and whose contribution to emissions and anthropogenic climate change is extremely low (see Halbmayer, this volume). They furthermore establish margins as *conceptual* sites since their visions, voices and strategies are still barely taken into consideration. Their opportunities for shaping climate policies are limited, and their strategies, expertise and long-standing place-based experiences with ecological change are neglected as opportunities for resilience. This is also because they are often inherent in forms of tacit knowledge, rather than in scientific abstractions.

However, according to Naucke and Halbmayer (2024, p. 7), it may also be in the margins where the "creative potential for transformation" emerges and where people have developed and already live forms of resilient lives that can be of great importance for more pluralisitic, more holistic and thus more sustainable pathways to the future. So let us explore the potential of these strategies of resilience in and from the margins.

EXPLORING DIMENSIONS OF LOCAL STRATEGIES FOR RESILIENCE

"As peasants, we can't leave our old ways of production behind because our old ways of production are based on local seeds." An elderly man, a member of the association in the small community in Ribáuè, Nampula, is raising his voice. JN and MM are sitting in the large circle of chairs set up in the square by the road, in the semi-shade of a tree on the sandy ground. The wind is blowing across the plain, freezing those present. However, this does not interfere with the conversation, quite the opposite. For over an hour, around 20 members of the community association take the time to talk to the two visiting academics – exchanging opinions on the effects of climate change in the community, passing on their own knowledge, but also asking questions about points that are unclear to them. When it comes to the topic of seeds, however, the man is quite unambiguous:

> These new varieties, yes, they produce a lot. But when it comes to storage, they get stale easily. And when it comes to sowing, if you sow these crops without fertiliser, they don't grow well, whereas our old seeds, whether sown with fertiliser or without, grow strongly. […]

> Generally speaking, with the new varieties you can do agribusiness. So we use them for commercialisation, while we use the old seeds for our consumption. […] They fortify us a lot. As we work hard, we have to eat good things! (Field notes MM/JN, Ribáuè/Nampula, 2022).

At first glance, ways of dealing with climate change seem relatively easy to identify – farmers change sowing dates and favour new seeds adapted to new climatic conditions, and fishers temporarily migrate in search for better fishing grounds. They diversify income activities by taking on wage labour in the cities or selling other products such as charcoal and wood (cf. Chichongue *et al*., 2015). We find these dynamics in our data, yet as the above vignette indicates, the actual situations may be more complex. In this case, while smallholders rely on new modified seeds, they are aware of its problematic implications and combine them strategically with their traditional ones.

We will now explore the diversity of local resilience strategies in more detail, presenting some of our empirical examples and organising them into three dimensions: i) everyday techniques and material infrastructure, ii) knowledge dynamics and iii) collectivity and commoning. These dimensions are interrelated and the strategies often encompass several of them. Based on the ethnographic examples, we will elaborate on some of the characteristics of these dimensions and identify general features of local resilience strategies.

EVERYDAY TECHNIQUES AND MATERIAL INFRASTRUCTURE

This first dimension resembles adaptation measures in political agendas and development programmes as they are commonly based on technical fixes and are implemented selectively and in a scheduled and planned mode. Other strategies imply technical innovations in everyday life, understood by James Scott (1987, p. xvi) as ordinary practices with little or no planning, no coordination and mainly based on local, tacit knowledge and existing networks that are often informal.

The former certainly includes strategies for dealing with water scarcity, as observed in Pará and Nampula. When climate change entangled with El Niño caused severe droughts in the Amazon region in 2023, in a small riverine community neighbours got together and dug a well for a family in a precarious financial position because their access to drinking water had dried up (Field notes MM, Santarém/Pará, 2024). Meanwhile, in Nampula, rural communities and civil society initiatives endeavour to build small dams and water catchment basins. They allow the heavy rainfall in the rainy season to be better utilised for rain-fed agriculture and horticulture in the region. This is one strategy

for tackling the problems of droughts and growing vegetables all year round, which secures household food requirements and provides income for families (Field notes MM/JN, Nampula, 2022).

Where some are struggling with water scarcity, in other places or at other times it is important to protect against water and its strength. In the case of the Colombian Caribbean region, one of the secondary effects of climate change is coastal erosion, mostly due to changing wind directions and currents (paired with constructions along the coastline). Although national and communal governments have implemented mitigation strategies, every day the sea swallows up more and more stretches of beach. Fabio Robles, a fisherman from Playa Salguero in Santa Marta, reports: "I have seen for the last 42 years how the beach, which provided us with our daily sustenance, has been eroded" (Fabio Robles, interview AC, Santa Marta/Colombia, 2022). Artisanal fishers have been one of the populations most affected by this situation, as their fishing grounds are located in the coastal zone. To prevent further erosion, they started to meet up and search for solutions. Eventually on the internet, they found an example in Mexico where local residents had reforested the beaches with mangroves, especially the beach grape, a strategy that proved very useful there.

> The secret lies in the root of the beach grape as it transforms the sand into something like a protective barrier," explains Mr Pomarico, a schoolteacher who is part of the group. "The reason is very simple: in its roots it forms what is called an ectomycorrhiza, based on an intimate relationship between fungi and roots. There is an excretion like rubber. Every time the root grows this rubber spreads and retains grains of sand, building a firm protective barrier that keeps the sea out (Mr Pomarico, interview AC, Santa Marta/Colombia, 2022).

With the help of the University of Magdalena in Santa Marta, they developed a project to fund major reforestation along the coastline in 2018. However, the funding is yet to arrive. Nevertheless, they have already planted a short one-kilometre stretch of beach as part of a pilot phase. Local residents are very satisfied with the positive effects, which extend beyond slowing down coastal erosion:

> With the mini-forest of beach grapes that we have here, the change in temperature is noticeable because its leaves are large and it provides shade, which is very refreshing. So what do we have? If we look at other parts of the beach without trees, the temperature is very high and we have to take shelter somewhere. But look where we are here. The temperature is pleasant, it is the same time of day, but what do we have for shelter? The leaves (Mr Pomarico, interview AC, Santa Marta/Colombia, 2022).

However, this example also illustrates how resilience strategies may be contested and that there may be different land-use practices in the same area, which call for different strategies. With its white sandy beaches and crystalline waters, the region along the Caribbean coast has been attracting national and international tourists for decades. Large hotel blocks have been built and cause conflicts

between artisanal fishing and tourist activities. As less beach space is available due to erosion, this dispute becomes more acute and translates into today's debates over mitigation measures. Thus, one of the obstacles to growing beach grapes in areas of coastal erosion has been opposition from the tourism industry, which considers the plant unattractive to the landscape and prefers to plant palms or other ornamental species that are washed away by the sea over time (Field notes AC, Santa Marta/Colombia, 2022).

Such strategies – drilling wells, constructing water basins, (re)foresting beaches – are certainly closest to what we commonly know as adaptation measures using technical innovations or improvements in infrastructure to secure and maintain livelihoods. The cases portrayed here are indeed specific as they were not implemented from the top down, but arose out of local initiatives.

However, some technical resilience strategies require less planning, are uncoordinated and emerge in everyday life. This is the case when local actors – as in the first vignette about combining seeds in Nampula – equip themselves with both types of seeds, sowing them according to their needs based on extensive agricultural experience. This strategy is not the product of a systematic search for improvement, but has developed gradually, through experiences with the new and old seeds – experiences that neighbours share in everyday conversations (Field notes MM/JN, Ribáuè/Nampula, 2022).

Knowledge

In the examples presented above, a second dimension is already apparent: the importance of knowledge. Elaborating on transfer, exchange, revitalisation and a combination of knowledge and expertise, we will highlight four types of knowledge dynamics that are relevant for the development of resilience strategies.

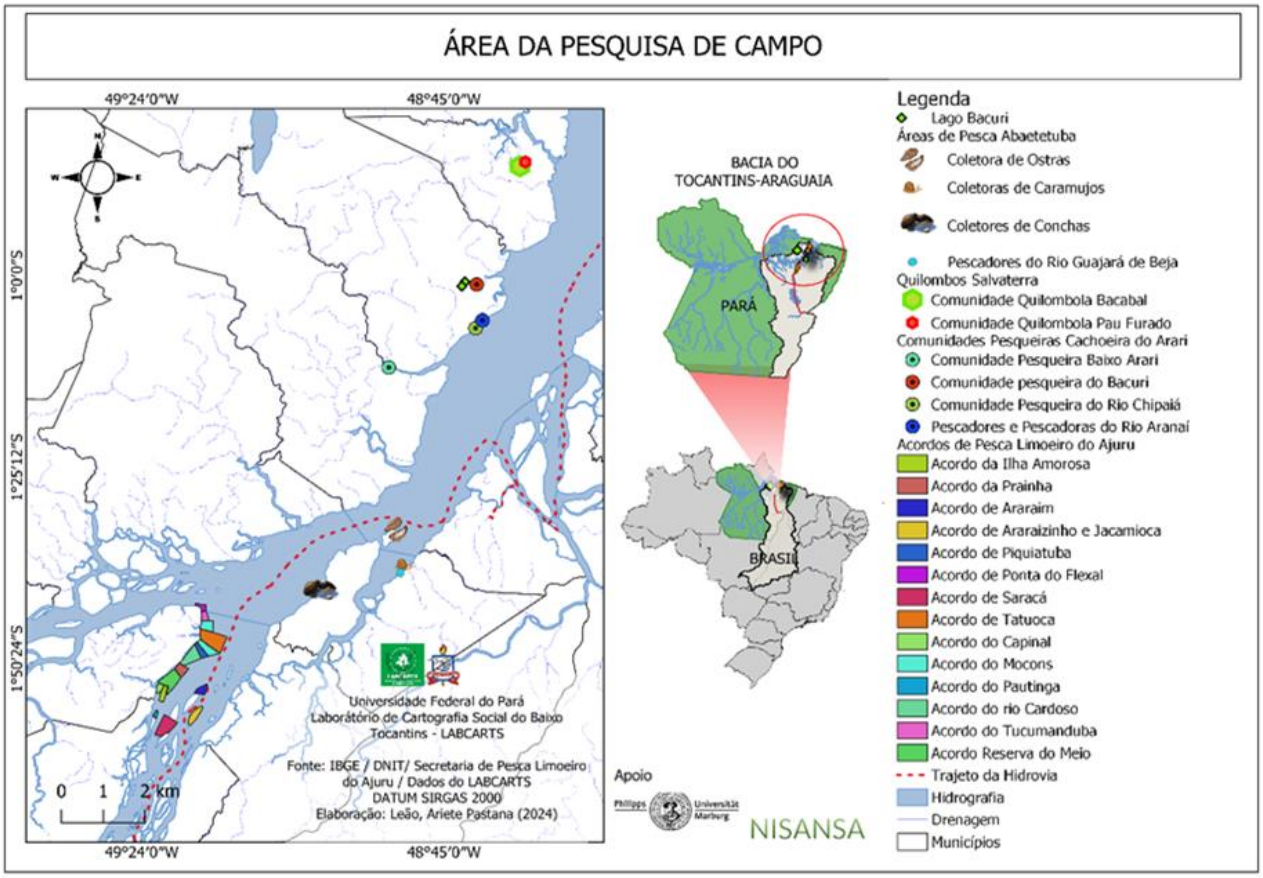
Transmission

Knowledge transfer is a common feature in numerous projects in the field of development and top-down projects of climate resilience. In the case in Nampula already described, transmissions of this kind occurred: when new forms of modified seeds started to be available in the region, smallholders learned and were taught how to use it appropriately (Field notes MM/JN, Nampula, 2022). These are usually hierarchical relationships in which the scientific knowledge of companies, state agents or non-governmental organisations (NGOs) is passed on to the formally less educated

rural population living in more precarious situations – by teaching them and raising their awareness. However, we have found other examples where knowledge is passed on horizontally, between people and groups in similar living conditions, and equally in the margins.

We found one such example in Limoeiro do Ajuru, at the mouth of the Tocantins River in Pará. ET and a group of her students visited an *Acordo de Pesca* – one of the community fisher associations that catch fish in the collective fishing grounds and monitor them to ensure there is no overfishing or entry of large external fishing vessels. In Limoeiro do Ajuru too, fish stocks are declining due to rising temperatures, falling water levels and drying lakes, which is intensified by the upstream hydroelectric dam Tucuruí. The barrage has cut off fish migration routes and changed currents, leading to a deposit of sediments in front of the community. As a result, fishing near the village has been significantly impeded (Field notes ET, Limoeiro do Ajuru/Pará, 2023). This is another example pointing to the entanglement of challenges in local realities. At the same time, it is an example that is not new to the region, but one that fishing families elsewhere have already been confronted with.

Figure 2 - Location of the study area and the Influence of the Araguaia - Tocantins Hidrovia on fishing territories.



This is precisely what the fishers in Limoerio do Ajuru are now benefitting from. With the support of the pastoral commission, they established a dialogue with families in the Marajó arquipelago. The exchange of experiences – in a horizontal relationship – helped them develop new strategies for dealing with the changed conditions in their fishing grounds (Field notes ET, Limoeiro do Ajuru/Pará, 2023). This is a creative form of public action in the form of "participatory learning" (Simões *et al*., 2014) in the face of new threats such as the increase in sandbanks related to the planned expansion of the Araguaia-Tocantins hidrovia, coupled with increasingly intense droughts.

Exchange

In Nampula, similar networking activities have even established an exchange of knowledge – in other words two-sided transmission. This was the case, for example, when members of two communities from different municipalities visited for several weeks in order to give each other advice and support and share experiences and expertise. While one community has many years' experience of growing onions to sell at the local markets, the other is experienced in building small dams to irrigate agricultural land. They learnt each other's practices during their time together and can now apply them in their own communities (Fielnotes MM/JN, Nampula, 2022).

Horizontal transmission and exchange of this kind are based on the recognition of locals as experts in their fields of practice. NGOs or civil society initiatives, sometimes also state institutions, are important mediators through whom the communities encounter each other – particularly in rural areas such as the Amazon region where distances are huge and transport is expensive.

When it comes to resilience, the knowledge dynamics in these cases are important as they enable local communities to acquire the expertise they lack. In doing so, they put themselves in a position to diversify their agricultural production, for instance, and thus secure their income if some varieties cannot be harvested due to weather conditions or fields cannot be irrigated during droughts. The fisher families in Limoeiro do Ajuru, Pará have learned not only how to deal with the changed conditions in their fishing grounds, but also how to network, thereby strengthening their voice and possibly the positions of marginalised communities facing the entangled challenge of climate change and large infrastructure projects.

Revitalisation

Resilience does not solely depend, however, on acquiring new knowledge and expertise. That it can be helpful in refreshing old traditions and traditional knowledge is clear in the following case from Ribáuè, Nampula. After having spent a couple of days with the local community association,

MM and JN met Vanito. This young community member had already attracted their attention in the discussions with his creative ideas and inspiring reflections. They sit on their plastic chairs in the shade of the overhanging roof and listen to him explain his perspective on the situation of his village in times of climate change. “A long time ago we used to build our houses according to the model of a hipped roof, so it had four sides: one, two, three and four”, he explains, pointing with his index finger to the fictitious sides of a roof.

> This type of roof was also resistant to strong winds. Then this new modern type with the gable roof came along. Also today, we cover the roof not just with straw, but with plastic sheeting as well to keep out the rain. But this means that the roof lifts up immediately when the wind blows. With the old type of four-sided roof, we’ve been able to protect ourselves better against cyclones (Vanito, interview JN/MM, Ribáuè/Nampula, 2022).

Then he ended with a thought that kept recurring in later interviews and conversations about similar moments of revitalisation: “You don’t always have to invent something new; sometimes you just need to remember.”

Combination and Hybridisation

A very stunning example pointing to moments of knowledge combination and hybridisation can be found in the Colombian association ASPROCIG. This association of smallholders, local peasants, fishers, indigenous communities and Afro-descendants in Baju Sinú, the lower river basin, is surrounded by wide wetlands flooding up to 60 % of the terrain during the rainy season. Its inhabitants have designed it as an intercultural space, due to the long history of migrations from the indigenous Zenú to Spanish, African, Dutch, German, Italian and Syrian-Lebanese migrants (Field notes AC, ABIF sol y Luna/Córdoba/Colombia, 2023).

In January, after having spent several days visiting different members of ASPROCIG, Juan Lopez invited AC and his colleagues for lunch at his place. This middle-aged man, a longstanding member of ASPROCIG, enthusiastically reported on the association’s ideas and visions, back when it was formed in the 1990s (Field notes AC, ABIF sol y Luna/Córdoba/Colombia, 2023). It was a time when local struggles were intensifying and living conditions in Baju Sinú were complicated. The insecure land tenure situation since the 1950s was still threatening local residents’ access to land, and it was exacerbated by the pressure of the armed conflict between paramilitaries and state actors in the 1980s. The new hydropower dam, constructed with joint investment of state and private capital, led to the erosion of riverbanks, loss of fish and unpredictable flooding in the lower part of the river where the communities live. The first effects of a changing climate became apparent in the form of

more regular flooding, droughts, rising temperatures and the entry of salt water into the river (Camargo, 2014; González-Madera, 2021, 213f.). This was when they set up ASPROCIG as an umbrella organisation of regional community associations. With its foundation, Mr López explains:

> It started a whole rethink of the organisation and a very beautiful process to recover our memory. We began questioning ourselves: who are we, where do we come from? And how can we integrate the [traditional] perceptions of the territory among [today's] fishermen, peasants, Afro-Colombians and indigenous people? (M López, interview AC, ABIF sol y Luna/Córdoba/Colombia, 2023).

Out of these engagements, the members agreed on a long-term proposal for ASPROCIG with a comprehensive vision to tackle poverty, undertake biodiversity conservation and secure the collective rights of local communities. The process was indeed fruitful and today ASPROCIG embraces encompasses 96 community associations, including more than 32,000 people from 6,000 families. They propose and practise a way of local rural development that is built from the bottom up. It encompasses and touches on both ecological and social spheres – starting from strategies against salination to food security and secure income opportunities for families, from emancipation and gender relations to education and reforestation (ASPROCIG, o.A.).

The combination of different knowledges and practices lies at the heart of their strategies and results in Methdologia Z, an approach ASPROCIG developed in the last few decades. The upper bar of the letter Z stands for ancestral and scientific knowledge, to which the members orient themselves. The lower bar, the practice and the knowledge and experiences acquired here, supplements it. The diagonal line, which symbolises the construction of shared values, holds the two bars together. Practice and knowledge are thus always oriented towards the construction of love, solidarity, fraternity and equity, always extending beyond the human being and integrating both human and non-human entities (Gongora Torres, 2023, 11f.; González-Madera, 2021, 213ff.). The method is not intended to provide a static programme, but assumes that knowledge is in a constant state of flux. There is also space for subjectivities in this process, thus ultimately "a wealth of ancestral knowledge has been developed and technological innovations have been utilized" (González-Madera, 2021, 215). A scientific and ancestral knowledge system – even implying different epistemologies and ontologies, as will become clear below – is not a contradiction in this case. On the contrary, members of ASPROCIG see their methods as a useful combination of both.

In practice, this translates into the kind of management of wetlands that has been done by the Zenués for centuries: people reinstalled networks of dams and water basins that contain fields and housing. The networks are able to absorb a great amount of water and therefore can easily cope with

medium flooding. The different areas can also be used to regulate salinity. Georeferenced data provide members with an overview of where it is possible to create such territories (ASPROCIG, o.A., 2ff.). This is an example of local resilience against climate change effects (floods and salination) based on both local traditional and scientific expertise and technology.

Hybridisation of knowledges is also reflected in the ABIF, the agro-biodiverse family system and a cornerstone of the ASPROCIG methodology. Based on agro-ecological concepts, the ABIF attempts to mirror the natural biodiversity in forests and thus create a natural forest area instead of a farming area. Normally, an ABIF is home to over 80 varieties from six plant categories: medicinal, ornamental, productive-protective, fruit trees, energetic and vegetables. It is positioned in such a way that the sunlight can be optimally utilised (ASPROCIG, o.a., 3f.; González-Madera, 2021, 215ff.).

Planting of an ABIF is geared towards fractal geometry and is based on the assumption of self-similarity – theoretical perspectives that emerged in the 1970s based on the observations of the mathematician Benoît Mandelbrot. The different families therefore organise their ABIF in a similar shape, and several ABIFs together result in a larger form of a similar shape, coming together with neighbouring community systems and altogether forming a similar shape, and so on. The individual ABIF is in turn a fractal (field notes mm, santa martha/colombian carribean, 2023; González-Madera, 2021, p. 216).

Ultimately, however, all of this is about much more than an agroecological approach to horticulture. It is about building up a different kind of society and having a good life, or as ASPROCIG frames it “viver sabroso” (González-Madera, 2021, 218f.). Mr López explained:

> The ABIF is the socio-ecological space where the family can coexist with plants and animals. So it becomes the realm where the epistemological thinking of ASPROCIG unfolds, where human hierarchies lose their protagonism. It is where the plant communities begin to make decisions, the animal communities begin to make decisions, all based on the logic of nature’s coexistence. The ABIF is that space where we build our happiness; it is a space where food security and sovereignty are possible, where gender and generational equality is possible, where families can build different economic systems based on solidarity, not on competition (Mr López, interview AC, ABIF sol y Luna/Córdoba/Colombia, 2023).

Listening to him reveals that there is more going on here than merely combining expertise. ASPROCIG and its methodology are an example of epistemologies of different kinds coming together and non-scientific epistemologies being given space. The strategies are about relating to the world in a fundamentally, even ontologically, different way than mainstream models in western society. One that runs differently from the dominant neoliberal and capitalist model and is based on solidarity. One that finally takes us to the next dimension of resilience strategies.

COLLECTIVITY AND COMMONING

Remarkably, often our interlocutors did not search for individual and personal answers. On the contrary: numerous examples demonstrate that actors see common and collective access to resources or collective forms of organisation as a way of ensuring resilience in the long run. In other words, local resilience strategies may also involve the dimension of social organisation and solidarity. Staying in Colombia with ASPROCIG for a brief moment, allusion was made to the collective spirit already being translated into collectively cultivated areas known as SSC (*sistemas socioecológico colectivos,* collective socioecological systems) and into the principle of collective leadership.

> There is another space in which all that epistemological logic materialises: collective socio-ecological systems. These are spaces where different families come together to learn to let go of the "Me" and begin to build the "We". It offers the opportunity to begin to understand the difference and that from this difference we can reach consensus. It is the possibility to coexist with others without killing each other, without crushing them; in other words, to learn how to resolve conflicts. […]. This collective exercise means that in ASPROCIG today we have a vision of "We". From there the logics of collective leadership arise, in the sense that ASPROCIG today does not have leaders, i.e. there is no one person in ASPROCIG who says "I am the leader" – there is something that is called 'collective leadership'. (Mr López, interview AC, ABIF sol y Luna/Córdoba/Colombia, 2023).

Frequently, local strategies found in our research revealed collective principles of this kind. The aim is to find sustainable forms of collective access – whether it be to water, land, forests, knowledge, funds or a good life, *vivir sabroso* for everybody, human and non-human. Finally, it is often about establishing or strengthening commons, thus about developing and finding forms of social organisation that makes commoning possible.

In Pará, we have frequently encountered such collective moments in relation to struggles over land – historically and today. As early as the 1970s, the notion emerged that "traditional" small-scale farming practices in the Amazon had environmental protection potential. Based on that assumption, in 1990 the Brazilian government started to create Reservas Extrativistas (Resex), environmentally protected areas for sustainable use by the local population. Land rights are granted to them collectively and officially; there is no possibility of demarcating private land parcels within Resex (Meurer, 2021, 98ff.).

Today, collective land rights continue to be important and can provide protection against the sale of land and advancing grain cultivation: in the plateau of Santarém, Pará, this is evident in Jatobá. The small community manages a plot of forest over which the neighbouring farmer also claims

ownership. He cultivates his large estate with grain and soybeans for international export – a dynamic that has increased dramatically in the region since the 2000s, when an international grain company constructed the large harbour in Santarém for international export (Fearnside, 2017; Gayoso da Costa, 4 jun. 2012, 221ff.). In 2024, the parties are still involved in a legal case and there is still no end in sight. In 2016 the community organised itself and founded an association that now holds the rights to the land. This allows the community members to cultivate it. If they move away, the parcel of land remains in the community and continues to be divided among them. Individual sales of this kind often occur because the relatively large sums of money offered are attractive and people are being put under considerable pressure, increasingly often including (the threat of) violence. Collective land rights offer protection against this (Field notes MM, Jatobá/Pará, 2024).

However, what does this have to do with climate change and resilience? Firstly, it provides resilience for the community itself, which ensures the livelihoods of their families on the land in a way that also preserves local biodiversity. In doing so, people create and conserve carbon sinks instead of emitting carbon. On the neighbouring grain fields, the opposite is the case. Secondly, the families produce for the local market and feed not only themselves but the urban population as well. In a region where food security is under acute threat from climate change and export-orientated large-scale agriculture, this is a very clear strategy for resilience.

Building up collective structures is also of great importance in the context of gender relations and emancipation. In Marajó, Pará, for example, women get together in associations and produce *cujas* – the typical Amazonian bowls made from nutshells – or organise their shell fishing collectively (Field notes E.T, Marajó /Pará, 2021). In Nampula, there are numerous women's organisations, the *Agrimulheres*, that work together on horticulture. In this way, they contribute to the family income and diversify their sources of income while also gaining more self-determination and finding strength in the organisation to oppose male influence (Meurer; Ntunduatha, 2023).

What people at our research sites have developed is thus in line with scientific debates on the potential of commons, including in times of climate change. Degrowth movements have boosted the scientific examination of commons and communing. Silke Helfrich and David Bollier (2015) highlight numerous and diverse examples, already and/or still lived in our world today. Against the pessimistic basic assumption that collective ownership inevitably leads to the overuse of natural resources, and against the economic certainty of the prisoner's dilemma and the human condition of homo oeconomicus (cf. Hardin, 1968), a plurality of lived examples demonstrates how users organising themselves in such a way allows common goods to exist and be strengthened in the long

run. Authors such as Kōhei Saitō (2023) or Pierre Dardot and Christian Laval (2017) consider communal activities to be the starting point for a social order that could establish itself beyond capitalism and its inevitable exploitation of nature. Arturo Escobar (2018), meanwhile, emphasises the alternative logics and non-dualistic ontological principles that could be implied by such lived initiatives.

Many examples from our field sites integrate this collective orientation without necessarily leading to the full collectivisation of all social sectors; quite the opposite, in fact. Certain aspects were mostly organised collectively, while others were based at individual or household levels. Agriculture, for instance, was undertaken almost everywhere by single households on their own plot of land, while the territory was frequently collectively owned by a community or association.

REFLECTING LIMITS – ON THE STRUCTURAL LIMITATIONS OF LOCAL RESILIENCE

We have focused our attention so far on a whole series of strategies that help actors in the margins gain security in times of climate change. We have seen that these strategies go far beyond technical responses and usually touch on dimensions of knowledge dynamics and social organisation as well. They often provide answers to the diverse problems on the ground and extend beyond the effects of climate change. In this way, they offer the local population an opportunity to defy adverse conditions and are often very promising. However, in practice they encounter a variety of challenges that we should not ignore.

Internal conditions

In their specific field, resilience strategies face a multitude of obstacles and hurdles – from a lack of resources to daily issues that are sometimes more pressing and thwart strategies, to internal hierarchies, dependencies and lines of conflict that counteract strategies. We give just two examples from Nampula.

In Ribáuè, this becomes visible when the landowner of the parcel near the new constructed water basin – a community member himself – blocks access. No longer able to make use of the water to irrigate their fields, the other community members now refuse to carry out jointly the necessary maintenance works on the crumbling dam wall. The water does not benefit the community and the dam is about to collapse (Fieldnotes JN/MM, Ribáuè/Nampula, 2022).

Internal limitations are further manifested in the struggles of many women's associations. As much as these associations can be important anchor points for resilience, ultimately they primarily point to the gender inequalities that still exist – which is why not all households have actually been able to change their social and economic situation over time (Fieldnotes JN/MM, Ribáuè/Nampula, 2022).

Ecological conditions

However, other limitations largely lie outside the local sphere of influence. This is the case with ecological and, in this context, especially climatic conditions. Climate protection efforts worldwide have not yet been able to counter global heating sufficiently, not least as they continue to run in parallel with fossil-intensive economic practices and development models. It is highly uncertain that the targets set to limit global warming to 1.5 °C can still be achieved. Even in the most optimistic forecasts, the socio-ecological consequences are predicted to be devastating (Masson-Delmotte et al., 2018).

This condition sets clear limitations on local strategies. If it gets drier, the newly bored well or community water basin will no longer be sufficient to provide water for drinking and irrigation. Even a four-sided roof is at risk if cyclones become stronger and more regular. The organisation of fisher families in Abaetetuba, Pará strengthens their voices, but will not prevent water from heating up or fish from dying. And so on.

On the other side, we can see that local resilience strategies are capable of transforming – constantly modifying and developing in order to adapt to or contest changing conditions. This mutability as one intrinsic characteristic of local resilience strategies may offer some hope that they can indeed continue to open up new scopes for action (Katz; Lammel; Bonnet, 2020; Rojas, 2016).

Socio-economic conditions

> Look, this is the river Sé. It has its spring over there, on the rice farmer's land. He also built this dam there and channelled the water onto his fields. This dam has killed the local part of the river. It is dry. The big road that runs through our territory has also dried up some of the rivers. All this has harmed us. We can't even name some of these streams anymore that used to exist because they have disappeared from the world (Cleiton Correa dos Santos, interview ET, Marajó/Pará, 2022).

Cleiton Correa dos Santos, a fisher living on the Marajó Island in Pará, describes the situation in his village. Once again, it is evident that local challenges in these times of climate change are intrinsically related to other forms of resource use in the same regions. In this case, it is the

monoculture of rice that a large landowner in the neighbourhood cultivates for national use and the system of overland roads constructed as part of the capitalist expansion into the Amazon region. These economic activities and infrastructures directly limit the low-emitting and low-intensive practices of the local fisher families.

The situation resembles the case of Jatobá presented above. The small community in Pará finds itself in a land rights dispute against a neighbouring landowner who produces soya and grain in monoculture for international export. To interpret this as a conflict between the community and an individual acting improperly is inadequate. Rather, the case reflects a very logical effect of capitalist economic activity on the ground. While struggles are locally fought, the reasons behind it lie in capitalist development models for the Amazon, oriented towards intensive resource extraction in order to guarantee national growth rates. These politics, however, are part of worldwide capitalist economic logics. Formulated the other way round, we have to recognise that the current dominant logics of the global market economy inevitably lead to the increasing expansion of cash crops in the Amazon – which threatens the lives of local communities as well as the local forests. Land conflicts and displacements are immediately limiting, affecting local strategies for resilience.

As already shown, in Pará these economic conditions lead to huge monocultures for grains but also to large-scale cattle farms, logging and mining. Nampula is crossed by the so-called Nacala corridor, a "development" corridor to transport coal to the coast. The coastline itself is today marked by extraction of heavy sands and other minerals, and a few years ago gas deposits were discovered that are among the largest in the world (Bruna, 2019). The Colombian Caribbean appears to be paradigmatic of a new extractivism in Latin America with its extensive coal-mining sites. Today, there is increasing investment in renewable energies such as wind energy, but critics speak of green extractivism, pointing to the dangers and damage to the local population (Ulloa, 2023).

These multiple situations demonstrate how economic practices dominant globally, limit local potential for resilience, while also contributing further to global warming. Local resilience strategies can hardly combat these regional dimensions. Nevertheless, it is exciting to have witnessed moments when local actors have indeed been able to shift structural social conditions gradually, for example when women's associations in Nampula gained a bit more equality and agency within their relations and households (Field notes MM/JN, Nampula, 2022).

CONCLUSIONS

Just as policy adaptation measures have their limits, local strategies for resilience also encounter limitations. They may be constrained by political and ecological conditions or internal local barriers. Yet they can offer potential for resilience and more sustainable pathways to the future that need to be taken seriously – and that we hope have been outlined in this contribution.

From the examination of different cases in Pará, Nampula and the Colombian Caribbean, we can draw some general conclusions about local resilience strategies. First, they exist and are rich and diverse. If we widen our gaze towards practices beyond explicit adaptation measures and formally organised projects, we find a whole variety of local approaches dealing with the challenges brought about by climate change. This once again demonstrates that margins are more than sites of marginalisation; they are also sites where creativity and local practices may inspire social transformations (see Naucke; Halbmayer, 2024).

Second, many local strategies are holistic and all-embracing. In many cases, they address more than just climatic challenges and aim to achieve a future with a good life for the community. This may render them less visible in debates on climate change adaptation – but precisely because of their comprehensiveness, they actually offer far-reaching potential for resilience. To emphasise it once again, the challenges are more complex in local reality and climate change-related difficulties are always linked with other local concerns. Comprehensive strategies of this kind to have a good life might generally be able to counteract this entanglement of multiple hurdles in local reality more effectively than selective climate change policies, which at times tend towards climate reductionism (Hulme, 2011).

Third, local resilience strategies are embedded, flexible and mutable. Embedded in the sense that they emerged within local logics and have thus already integrated the specific local cultural, social and political foundations – pre-conditions with which many externally designed projects struggle. They also draw on empirical experiences and have been tried, tested and further developed in practice. As they primarily exist in practice, they remain mutable and flexible to a certain extent. Unlike externally designed projects, they are *per se* in a state of flux. It is precisely this processual character that provides them with the potential for resilience because they are able to continue transforming and adapting to constantly changing conditions and challenges.

Forth, they provide answers that are multidimensional and go far beyond technical fixes. They touch on the dimensions that have structured our contribution – everyday techniques and material infrastructure, knowledge, collectivity and commoning – but certainly go further. They also prove

that there are lived alternatives that are different from capitalist and/or western, naturalist epistemologies, ontologies and related human-nature relations.

Although these strategies cannot simply be transferred to other contexts[11], they do teach us lessons and can be inspirational. For the discussion around climate action, they demonstrate that it is not only about socio-ecological *transformation*. In fact, there are already ways of life in practice that are sustainable and should not be transformed, but rather protected and strengthened (see Halbmayer, this volume). At the same time, they are examples of far more comprehensive pathways than are designed by today's climate politics. Pathways that go beyond technological innovation and that search for forms and ways to have a good life. They often place the collective at the centre and are not geared to a paradigm of growth. Although they are not transferable as models, they could be an inspiration for thinking and living climate action more thoroughly. Not least, they demonstrate that a different world is not only possible, but is already being lived.

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[11] Although the expansion of ASPROCIG, the transmission and exchange of knowledge, the invention of new organizational forms are steps in this direction. It is not about the transfer of fixed technological solutions, but of experiences, practices and proposals. These will have to be innovatively adjusted or recreated to fit other and new social and ecological contexts.

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