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Communication

# Community-Based Adaptation as a Transdisciplinary Approach and Instrument for a Social-Ecological Transformation

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**Abstract:** Adaptation to the impacts of human induced global heating is inevitable. For a socially just and ecological sustainable adjustment to these new circumstances, we need to draw from diverse knowledge systems while, simultaneously, foster a social-ecological transformation. We approach these concerns through the concept of community-based adaptation (CBA) and discuss remedies. Synergies with feminist knowledge systems and indigenous ways of living show the transdisciplinary essence of CBA. By abstracting from its origin and overlapping disciplines, revealing the social metabolism as a common problem, CBA is prone to achieve more equitable and sustainable adjustments. Transdisciplinarity itself and the current related CBA literature point beyond mere adjustments and call for a redesign of the social metabolism, thereby shifting from adaptation to global heating towards adaptation with nature by focusing on social provisioning. An engagement with transformative adaptation and heterodox economics further shows the potential of CBA to serve as an instrument in support of a social-ecological transformation by addressing root causes of vulnerability and by fostering epistemic justice. Reflecting these points back on the epistemological and ontological assumptions of CBA, the viewpoint proposes critical realism as a guiding philosophy of science to move forward.

**Keywords:** community-based adaptation; transdisciplinary; critical realisms; social-ecological transformation

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## 1. Introduction

Human-induced global heating above 2°C will increase pressure on livelihoods and wellbeing. Alongside efforts in mitigation, adaptation will be required for social and ecological systems to function. Unequal distribution of the impacts of climate change geographically as well as within society further requires special attention to the most vulnerable groups, a concern that community-based adaptation (CBA) can address. CBA emphasises participatory, inclusive decision-making and a needs-focused design of activities. One challenge of more impactful adaptation is the information base for decision-making and the definition of needs to be addressed – in other words, a question of what knowledge to be used and (re)produce. It is widely recognized that in CBA projects, knowledge should be co-produced with the communities (Bronen et al., 2020; Ford et al., 2018; Kirkby et al., 2018), however, the extensive elaboration of transdisciplinarity to expand knowledge systems remains to happen (Kirkby et al., 2018). Another challenge is the application of CBA to empower communities while incorporating reduced efforts to disenfranchise and substitute oppressive structures that hinder more impactful adaptation in the first place (Galvin, 2019) e.g., social inequalities, unequal exchange, or neo-colonial exploitation. In turn, this calls for addressing the root causes of global heating through fundamental interventions to change the status quo (Morrison et al., 2022).

As first step, this viewpoint brings CBA principles in a conversation with transdisciplinarity answering the call from Kirkby et al. (2018) and consequently with indigenous and feminist approaches to knowledge, knowing, and the knower. Secondly, to distil the “common problem” that transdisciplinary aims for the viewpoint abstracts from the origin disciplines of CBA – disaster risk reduction, community-based natural resource management, sustainable development – to suggest that its common denominator is adjustments to the currently destructive social metabolism - the material flow or exchange between ‘nature’ and ‘society’. As a third step, the viewpoint argues that a socio-ecological transformation incorporates changing the social metabolism that makes adaptation necessary in the first place (Brand and Wissen, 2017). This also contributes to several attempts in the literature to utilise CBAs potential for transformation and social change (Dodman and Mitlin, 2013; Fox et al., 2021; Nath, 2024). For that, yet another conversation for CBA with transformative adaptation, political economy, and heterodox economics offers insights into how adaptation needs fundamental politicalization and addresses root causes of vulnerability to be more impactful. To enable fruitful transdisciplinarity that uncovers and addresses structural causes the viewpoint proposes critical realism as an overarching philosophy of science as guidance in how to move forward - considering the above matters of transdisciplinarity as well as the causes of and need for a social-ecological transformation while simultaneously fostering epistemic justice. In line with feminist and indigenous critiques of positivist science of the Global North and the application standpoint theory (Foley, 2006; Hekman, 1997) we want to make transparent that the three authors are white, cis-male, able bodied, and born in the Global North which requires critical reflection upon reading.

## 2. Learn from Various Sources

To increase the potential of adaptation, Eriksen et al. (2015) argue that adaptation practice and analysis must “engage with multiple adaptation knowledges, to question subjectivities inherent in discourses and problem understandings, and to identify how emancipatory subjectivities [...] can be supported”. One way to do that can be the practice of transdisciplinarity that resonates with CBA (Kirkby et al. 2018) and which Alvargonzález (2011) conceptualises in general in four trends.

First, the systematic integration of knowledge refers to the emphasis on co-production of local and ‘scientific’ knowledge for CBA (Magee, 2013) meaning that transdisciplinarity and community-based approaches ought to include indigenous and feminist ways of knowing. Second, transgressiveness as the pushing of the boundaries of constructed identities (class, gender, race, and so on) takes on the rising interest in power imbalances and critical aspects within CBA literature along the lines of social inequalities (Nath, 2022; Yates, 2014). This will be reflected in the conversation with CBA and heterodox economics linked with the transformation of root causes of vulnerabilities. Third, going beyond the boundaries of disciplines’ perspectives by embracing a more holistic approach was integrated into a CBA (Clarke et al., 2019). Fourth, ‘problem-solving’ as a focus on the practice and its reflection back on ‘theory’, with its main example and application in environmental research, corresponds to the practical approach that CBA had from the beginning (Ayers and Forsyth, 2009; Forsyth, 2013; Reid et al., 2009). This leads this viewpoint at the end to suggest a philosophy of science to uncover previously overlooked spatiotemporal structures enabling an applicable CBA that solves problems on the ground. In line with the above and the valuation of epistemological diversity in climate adaptation (Mills-Novoa, 2023), the next sections look at the engagement of CBA with local indigenous and feminist knowledge.

### Local Indigenous Knowledge

The importance and inclusion of Local Indigenous Knowledge (LIK) for CBA projects in co-production with Global North epistemologies has been acknowledged and used (Assani et al., 2024; Bronen et al., 2020; Ford et al., 2018). LIK can be described in various ways, however, some basic characteristics resonate with CBA: 1. A strong connection with the (local) environment 2. A holistic approach towards being together 3. Dynamic and communal essence of knowledge and 4. Place-based. CBA with its origin in community-based natural resource management (CBNRM), the

material exchange with the local environment, rather relates to an ontological dualism. Ontological dualism bears the risk to interpret global heating as an external shock rather than understanding its endogeneity. Opposing dualist tendencies of separating 'nature' and 'society', LIK tends to minimise the separation of people and the environment. LIK emphasises not only the importance of observation but the engagement and integration of the perspective(s) of the studied objects (Cruikshank, 2012; De Castro, 2019). Based on their ontological understandings, many communities and LIK systems avoid the Eurocentric reductionist philosophy which further includes the separation of disciplines or fields like art and science and instead approach things holistically which arises within CBA (Ayers et al., 2017; Fox et al., 2021). The dynamic and communal essence of LIK resonates as well. Jarillo and Barnett (2021) argue that communities are spatio-temporal dynamic networks, so a fluid definition of community, while acknowledging that communality, a common purpose, is an important factor for project success. Furthermore, place-based knowledge is central to CBA as first local needs depending on the nearby environment must be addressed (Magee, 2013) and they differ from community to community. In most LIK systems, knowledge as a noun rarely exists. It is then connected to the knowing entity and rather understood as a verb in its practical application and linked to the feedback from the local environment. A more just term could be thereby 'indigenous way of living' (Morris, 2010; Semali and Kincheloe, 2002).

### Feminist Epistemology

Western epistemology, as masculine or patriarchal, should not only be challenged, supplanted, or supplemented by indigenous 'ways of knowing' but rather a feminist lens on knowledge production and meaning-making should be applied. Feminist epistemologies can be described in various ways however some characteristics resonate with CBA. We find it as follows: 1. Epistemological relevance of the standpoint of (marginalised) communities and their members 2. Inclusive decision-making processes 3. Normativity of science opposing neutrality 4. Empowerment as a goal 5. Participatory action research as a method. The core of CBA concerns focusing on the most vulnerable with the emphasis on co-production of knowledge, design, and evaluation. In doing so CBA aims to counter technocratic approaches of adaptation (Eriksen et al., 2015), which are based on epistemic injustices by applying 'global' knowledge produced by the Global North (Hulme, 2010). As such, CBA aligns with feminist epistemologies that view universal knowledge held by a minority critically. Further, to include those formerly excluded marginalised voices into decision-making is seen by both as highly valuable for the outcome due to a wider and more even epistemological foundation let alone the moral necessity. All in all, feminist epistemologies highlight the value of participatory or practical action research as an important tool to make the former four points more of a reality. This is a key pillar and method of CBA as well (Ensor and Berger, 2009). However, feminist perspectives further advocate for a deeper understanding of effects and how subjectivities formed by institutions influence adaptation. Approaching CBA via feminist epistemologies has the potential to address various issues such as (neo)colonialism, care for community development, and bringing gender justice (Dengler and Lang, 2022; Dengler and Seebacher, 2019).

### 3. From the Origins to the Roots

Transdisciplinarity can be seen as a tool to address climate action more thoroughly and to grasp complex social and ecological problems by expanding the horizon of knowledge production. This requires the description of a "common problem" in the first place, around which transdisciplinary can take shape (Cundill et al., 2019; Gugerell et al., 2023). Such a common problem description can be brought out by reviewing and abstracting from the origins of CBA - disaster risk reduction (DRR), sustainable development (SD), and community-based natural resource management (CBNRM). By examining the activities of the three disciplines placing them in a social-ecological system (SES) and describing their relation to CBA it is possible to name the social metabolism as a common denominator. The social metabolism makes up the physical material interaction between a social and ecological system (Brand and Wissen, 2017) and can as such reveal overproduction and -consumption of resources which is an essential information for communities to shift towards sustainable practices

and the identification of vulnerabilities. DRR can be described as a response, CBNRM as stabilisation, and SD as an optimization of the social metabolism in its current destructive form.

The notion of “social” indicates that the metabolism is mediated by specific local structures of production and labour. Further, the social metabolism can be a useful concept for CBA as it also requires a holistic and transdisciplinary understanding by fusing and showing the interconnectedness of the natural and social sciences, thereby advocating for a diverse integration of stakeholders. As such, it takes a central role in analysing SES where CBA can be seen as embedded (Basel et al. 2020; Ensor, 2014; Ensor et al., 2018).

There are multiple understandings of adaptation (e.g., Pelling, 2010) from which aspects can contribute to the concept of CBA. Climate change adaptation itself is historically influenced by multiple disciplines ranging from systems ecology to political ecology and resilience theory. Adaptation can be explained as the phenomenon of adjustment to current or anticipated climate impacts and their repercussions. Within human-environment systems, adaptation aims to mitigate or prevent harm and capitalise on advantageous opportunities. Given the current state of the human-environmental system, this basically amounts to an adjustment to the current destructive social metabolism. Taking the forward-looking perspective of adaptation further, the ongoing crisis resembles a moment with a higher transformative potential (Novalia & Malekpour, 2020). This leads to question how and in what direction adaptation should exploit benefits while adjusting to climate impacts.

DRR means the systematic minimisation of vulnerabilities and mitigating the impacts of or preventing disasters. This is commonly approached through activities like early warning systems, capacity building, and infrastructure development. CBA also includes parts of the comprehensive approach of vulnerability assessments to increase community resilience – not only for climate related impacts. Both recognize that affected people are ideally positioned to understand and manage the specific risks they face. Essentially, DRR is a response to shocks in a SES which is based on how the social metabolism works.

CBNRM refers to a sustainable economy with the surrounding ecosystems and emphasises the interconnectedness of local natural resources and communal well-being. Realising, managing, and strengthening this interrelated exchange increases the resilience of the community which is in line with CBA. CBNRM is essentially a way to stabilise the connection between the social and ecological, managing the social metabolism in a regenerative manner, it constantly seeks to balance extraction and conservation of resources in the local context.

SD emphasises meeting the needs of the present without compromising the ability of future generations to meet theirs. It can act as guidance for CBA to design projects in a socially, economically, and ecologically sustainable manner which enhances communal adaptive capacity by focusing on livelihood improvements and linking adaptation to broader goals of justice. Essentially, SD attempts to optimise the social metabolism, while not depleting natural resources at an unsustainable rate, and distribute its benefits more equitably.

CBA has proven to be beneficial together with multiple disciplines like biodiversity protection, nature-based solutions, or ecosystem-based adaptation (Reid, 2016, 2014) for adjustments to the destructive social metabolism. However, CBA should extend beyond this scope, make use of the differentiated insights, and attempt to redesign its mechanisms towards a (socio-ecological) transformation that addresses root causes of vulnerability to climate change (Dodman and Mitlin, 2013; McNamara and Buggy, 2017; Nath, 2024). It is these root causes that require adaptation in the first place and if not addressed continue to do so until adaptation limits are reached. Engaging with these ‘multiple adaptation knowledges’ above holds the potential for a social-ecological transformation (Eriksen et al., 2015). Ensor (2014) states that “[...] seeing communities embedded in linked [SEs] means that transformation will need to account for ecological as well as socio-political sustainability. Integration of these themes - of equity, economy and ecology - is at the heart of the challenge of transformation and CBA.” The questions remain as to what does the relationship between CBA and a social-ecological transformation involve and what is required to go beyond the current “mere adjustment”?

#### 4. Tackling the Root by Bridging Disciplines Pieces Together

In the face of human-induced global heating, transformation in the form of fundamental change for global and local societies to counter, stabilise, and adapt to the ecological collapse is inevitable. It became increasingly clear that ecology and social inequality must be thought together leading to the widely used term social-ecological transformation as a remedy (Brand&Wissen 2017). A socio-ecological transformation as a concept has very different meanings along academic and practical lines but fundamentally refers to what we think is the reparation and stewardship of the social metabolism in an equitable and sustainable manner (Brand and Wissen, 2017; Bruckmeier, 2016; De Molina and Toledo, 2014). This brings CBA into play. It implies that „responding to climate change should be seen not as a technical problem to be managed away but as an opportunity to radically rethink and rebuild social, ecological, and economic relations.“ (Manuel-Navarrete, 2010).

Achieving such a transformation of the social metabolism on the local and larger scales requires politicisation or as Brand and Wissen (2017) put it with Görg (2011): “The societal regulation of interaction with nature is possible and does in fact occur; herein lies a central dynamic of politics.” A normative orientation is then necessary to guide how a transformation should occur and where it should lead to. Transformative adaptation (TA) literature offers the contribution to a more sustainable and equitable society as a normative aim (Deubelli and Mechler, 2021; Scolobig et al., 2023). TA entails the reshaping of power relations in society through radical political change as a condition for the normative aim (Pelling, 2010). To address root causes of vulnerability, such as political economic structures, and to facilitate community voices in decision-making ensuring local needs are met, are prerequisites for a social-ecological transformation (Fedele et al., 2019). However, TA mostly falls short to be transformative in practice (Fazey et al., 2017). A more rigorous understanding of structural and higher-level drivers such as “capitalism and materialism” (Morrison et al., 2022) as well as asymmetrical power relations (Nath, 2024) with a focus on political economy (Walker and Cooper, 2011) becomes a prerequisite for transformative adaptation (Roberts and Pelling, 2019). These are structures beyond a particular community level but nevertheless influence CBA projects. The interaction between root causes from different spatiotemporal structures with the local context is therefore a relevant focus for transdisciplinary and holistic CBA.

Involving disciplines that challenge these root causes can amplify CBA in two ways. First, it allows for CBA to expand to far-less explored contexts. A variety of power structures that reproduce the root drivers and repeatedly feed into them originate in the Global North. Second, understanding those structures and how they manifest increases CBA’s potential for a socio-ecological transformation. This leads us to review three heterodox economic projects for three reasons. First, they are closely related to CBA in certain aspects enabling synergies. Second, they provide a deeper understanding on how to achieve a socio-ecological transformation. Third, the economy is the core system behind the destructive social metabolism justifying the limitation on economic strands of thought.

One theoretical strand capturing all three aspects mentioned by Ensor (2014) (economy, ecology, and equity) is degrowth as a heterodox economic approach. Degrowth aims explicitly at the reduction of the material metabolism in a democratic manner reshaping power relations in societies (Kallis et al. 2018). Social justice and community well-being within a changed metabolism are a normative orientation by overcoming the economic growth paradigm as the root cause of vulnerability (Hickel et al., 2022). Yet, degrowth focuses its scope and strategies for change on the Global North by acknowledging its historic responsibility to minimise global heating (Hickel, 2021). While degrowth increasingly recognises the role of the state it has a long tradition of focusing on communities and increases its engagement with Global South perspectives (Dengler and Seebacher, 2019) on which CBA can draw.

Focusing more on the theory of change, evolutionary economics provides another heterodox economic perspective that can increase CBA’s potential for change. Evolutionary economics argues that change occurs mainly on the meso, so communal, level (Dopfer et al., 2004). Particularly in niche situations, where oppressive structures inhibiting change are absent, new institutions develop

(Pagano, 2011). CBA focuses on the meso level and can bring a deeper understanding of how changes at the different levels interact by engaging with evolutionary economics.

Another beneficial strand can be feminist economics. It views economic processes through a gender-sensitive lens thereby revealing social inequalities, the (de)valuation of care work and (un)just access and treatment on the labour market (Dengler and Lang, 2022; Perkins, 2007). Feminist economics emphasis inclusive decision making, social justice, equitable distribution of resources and local agency (Power, 2004) which resonates with the CBA need-based approach like the focus on local contexts, community empowerment, power imbalances and activities like women-led initiatives and gender sensitivity workshops.

A discussion between CBA, degrowth, evolutionary and feminist economics can yield benefits for the former in form of a better integration of how to tackle political economic root causes of climate change vulnerabilities. Next to the question of disciplines that provide insights for CBA comes the question of how to avoid implicit misunderstandings but to enable a fruitful engagement between disciplines. A critical engagement with epistemological and ontological assumptions can support transdisciplinary CBA in addressing this issue.

## 5. Bringing it Together - Ontology and Epistemology

CBA is well suited to challenge the positivist reductionist conception of science of the Global North by acknowledging the value of local (indigenous) knowledge and considering issues of power imbalances as structural obstacles to overcome for more impactful adaptation, actual livelihood improvement, and progressive social change. Our argument in this viewpoint is to push this further, facilitating CBA for a SET aligning with this trend and figuring out what is thereby reflecting back on the epistemological and ontological assumptions made for it. This is important because „changes in our systems of knowledge production could not only inform better understandings of ecological change but could also offer new possibilities for viable futures in the face of a variety of present and future threats“ (Paprocki, 2022, p. 2). Therefore, CBA can benefit from forming a pre-analytic vision necessary to engage with other disciplines. A pre-analytic vision includes an explicit ontological and epistemological understanding (Spash, 2012). Simply put, ontologies and epistemologies influence what methodologies and methods are used and how far disciplines can be combined. For example, CBA has differing ontological commitments compared to neoclassical economics and should refrain from integrating neoclassical methods in its approaches. While neoclassical economics has a closed system ontology consisting of isolated homogenous (rational) individuals (Arnsperger and Varoufakis, 2006; Lawson, 2013) CBA emphasises the existence of heterodox actors relating to each other (Aslany and Brincat, 2021; Chung, 2022; Kirkby et al., 2018). Methods used in the former capture individual preferences while CBA resonates more with deliberative formats emphasising connectedness. Yet, a pre-analytic vision has a certain transdisciplinarity because it allows researchers to reflect on their standpoints and look for other compatible worldviews enhancing the picture. We propose critical realism (CR) as an overarching philosophy of science as a base for CBA and its transdisciplinary endeavour. CR argues for a realist ontology combined with a weak relativist epistemology and judgemental rationality (Archer et al., 2013). While climate change vulnerabilities exist independent of our knowledge about them (realist ontology), CR points to the socially constructed understanding (relativist epistemology) of such vulnerabilities (Buch-Hansen and Nielsen, 2023). With such a differentiation CR informed CBA can avoid accepting vulnerabilities a priori but instead emphasise the causes that lead to empirically observed ones (McKeown et al., 2022). Causal explanations in CR refer to structures (e.g., economic growth) that operate through mechanisms (e.g., evaluation criteria) causing events (e.g., adaptation contributing to economic growth). Generally, CR considers reality as stratified. This puts importance on emergent phenomena making objects, including social structures, irreducible to their individual parts. This enables CR to allow for double hermeneutics, i.e., the interpretation of already interpreted phenomena, because "[a]lthough social phenomena cannot exist independently of actors or subjects, they usually do exist independently of the particular individual who is studying them" (Sayer, 2010, p. 33). This resonates with CBA and the study with communities and their social structures as emergent phenomena based

on relations between people. Aligning with the LIK interpretation of knowing CR emphasises knowledge as work (Sayer, 2006). As such, knowledge is applied in the world and the practical adequacy of claims becomes a validity criterion for 'truth'. Hence what is important is the relation between the real entity (transitive object) and how science refers to it (intransitive object). Aligning with feminist epistemologies a concept (intransitive object) is not a true representation of a real object in its entirety, but instead influenced by social constructions. Followingly, knowledge is always fallible. Nevertheless, judgemental rationality focusing on practical adequacy of statements and their alignment with previously adequate knowledge allows one to choose between contesting explanations (Sayer, 2010). Yet, CR does not state which substantive accounts are the most fitting ones (e.g., how CBA must look like) nor does it propose an encompassing method (Danermark et al., 2002). Instead, it enables different approaches to engage with each other on a common understanding of how to approach and study the world. As such, CR is "fundamentally pluralistic" (Buch-Hansen and Nielsen, 2023, p. 352). Consequently, CR provides applicable tools for place-based transdisciplinary research (Cockburn, 2022). This viewpoint argues that CBA theory and practise not only have the potential to adjust to but also restructure the mechanisms of the currently destructive social metabolism by being an instrument for a social-ecological transformation. Transdisciplinarity and engagement with heterodox economics might allow CBA to unleash its transformative potential and foster epistemic justice while ensuring that local community needs are met, well-being is improved, and root causes of vulnerability are tackled. Finally, to promote meaningful discussions between disciplines and knowledges we point to CR to guide CBA towards more impactful adaptation.

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