

# 11 Challenges of transdisciplinary research collaboration for sustainable development

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The starting point of this book was to synthesize ideas, methods and applications from different academic disciplines in transdisciplinary research and their approaches to transdisciplinary collaboration (TDC). Our intention has been to map shared and diverging concepts and tools applied by scholars in various disciplines addressing sustainability issues. The contributions in this book comprise concepts, methods and case studies in a wide span of transdisciplinary collaboration with different societal stakeholders, such as companies, political decision-makers and local people.

The writing and editing of this book have been a joint journey, navigating through numerous examples of research projects and contributions to theoretical foundations of transdisciplinary it, and its methodological and ethical implications. The various chapters illustrate that in practice a fair level of pragmatism guides the collaboration of academics with non-academics in a wide variety of cases.

In this final chapter we reflect on what the journey has delivered.

The concept of transdisciplinarity is rooted in the social change ambitions of the 1960/1970s, with Jantsch calling for adapting universities ‘as a means of increasing the capability of society for continuous self-renewal’ (Jantsch, 1972, p. 12; see section 2.1), and is still mostly focused on intra-academic collaboration. Yet, in the new millennium TD has been increasingly taken up in varying fields of sustainability research as a form of outreach beyond the fences of universities. This adaptation seems essential for creating the transformations needed (section 2.2), thus making sustainability and transdisciplinarity natural allies and agents of change.

Sustainability requires the analysis of place and context-specific phenomena, which is challenging, especially in a wider socio-ecological systems context. Transdisciplinarity, on the other hand, enables the feeding of such analysis by connecting to more sources of knowledge and information than the ‘mode 1’ type of science relies on (section 2.3), while also enabling shared learning and application of this new knowledge by the actors connected to the phenomena studied.

How and to what extent academic and non-academic actors manage to engage in open and responsive discourses is a key factor for success, both for sustainability scientists and for societal transition processes. This deviates from the image of the anthropologist, who investigates in splendid isolation among his research

subjects, as described by Lévi-Strauss at the start of the first chapter of this book. The essence of TD is to team up with stakeholders and commonly become agents of transformative change for sustainability.

This implies that transdisciplinary research requires fundamentally redefined roles for researchers, and for their academic institutions (section 3.1), enabling them to go beyond disciplinary knowledge generation. The book shows many examples of scholars who, embarking from diverse disciplinary ‘harbours’, have been navigating their specific societal research fields, collaborating with people and organizations in society.

We see scholars starting from the discipline of *industrial design*, designing a solar streetlamp in Jhong Village, Nepal (Chapter 4); or developing a new shade on the path between the Indrachowk and Chhobhar communities in Nepal (Chapter 7). Other scholars started from the field of *sustainability management*, setting up an international project supporting universities and their industrial partners in applying corporate sustainability concepts and tools in lower income countries like Uganda, India and Nepal (Chapter 6) or collaborating with the Norwegian fishing industry on applying the UN sustainability goals (Chapter 10). In Chapter 8, examples of projects in the field of *entrepreneurship* engaging with social entrepreneurs in the Swedish cities were presented, while one of the scholars in Chapter 10 worked with grassroots innovators in Colombia. In the fields of *sustainability science* and *sustainable agriculture*, scholars have been the departure points for a project on sustainable coffee in Burundi (Chapter 9), or on land management in Germany (Chapter 5).

These examples illustrate the growing attention in many scientific communities (partly in specific disciplines, but also in interdisciplinary academic settings, like sustainability science groups) for new forms of collaborative knowledge creation and application. In Chapter 2, three different ‘tastes’ of transdisciplinary research were identified (shown in Figure 2.5), which are illustrated in the various chapters: intra-academic transdisciplinarity (Chapters 5, 10), solution-oriented transdisciplinarity (Chapters 4, 5, 10), fairness-driven transdisciplinarity (Chapters 8, 9, 10) and small-range transdisciplinarity (Chapters 6, 7, 10).

The chapters also illustrate the various stages in the academic career of researchers applying transdisciplinary research, with the authors reflecting from the perspectives of their different roles. Some have been project leaders or partners in (multiple) larger scale projects (Gawell, Keitsch, Spangenberg, Vermeulen), or were applying TD in the context of higher education programmes and projects (Fet, Keitsch, Knudson, Vermeulen, Witjes), while in some cases TD is part of PhD research projects (Ramos-Mejía, Macintyre, Rosenberg, Witjes, Vildåsen). The cases presented further comprise a great variety of collaboration with non-academic actors in various geographic contexts: with industries and SMEs (in Burundi, Colombia, Nepal, Norway, Uganda), with local communities (in Burundi, Colombia, Nepal) and with local authorities (in Germany, Nepal, Sweden).

The forms of collaboration and communication in the chapters are in some cases organized in a structured way, referring to some of the methodological

literature shown in Table 3.3, but in many cases an ad hoc project- and context-specific approach is applied. Several projects had transdisciplinary ambitions and implications, while being organized in a pragmatic way, leading to stakeholder involvement in later stages. Chapter 6 gives an example where transfer of academic knowledge to universities in low income countries was first needed, before outreach to local companies could be established.

Some examples in other chapters refer to individual PhD research projects, where single researchers with limited time and budgets as well as additional procedural PhD-requirements had to balance their academic output with the time needed for the required iterativeness and multi-actor engagement in the research design and implementation (section 3.3). Allowing for stakeholders' knowledge inputs, multi-level learning may be easier to implement in post-docs' and senior researchers' projects than in individual PhD research, relating to their levels of experience and authority. The more so for sharing the role of defining the research questions with non-academic actors. The formulation of research questions is in academic traditions seen as a core responsibility for the PhD, while both real-world needs and scientific requirements are addressed in TD contexts. In some cases, this results in obstacles for co-construction of research questions (see also Lang et al., 2012, p. 33; Herrero, Dedeurwaerdere and Osinski, 2019, p. 18).

Chapter 3 suggests distinguishing between the three levels of individual researchers' projects, research institutes' research portfolios and the research strategies of the research institutes. Some of the ambitions of TD collaboration may be better linked to the last two levels than to individual projects, especially for early stage researchers. The literature on methods for TD hardly addresses this so far.

One of the red threads in the chapters is the diversity of roles to be taken by TD researchers.

Chapter 3 discusses the triple process focus of TD researchers, as facilitating collaboration (initiation and continuation of the process), as ensuring meaningful knowledge creation (content of the process) and as warranting feasible and applicable outcomes (implementation and validation of the process). Chapter 8 describes the TD researcher's role as a threefold combination of practitioner, scholar and designer/professional by applying Schön's concept of the 'reflective practitioner' to TDC. In a dynamic time and space relation, these roles often comprise the process steps mentioned earlier plus anticipating systemic and prolonged impacts of co-produced solutions-based conditioning factors and the values governing them.

Chapter 6 adds to this a set of skills and capabilities of TD researchers, including the availability and development of personal traits, like open-mindedness and willingness to revise one's views to integrate insights from other disciplines. This requirement transcends not only the boundaries of science but claims that scientists should also be open to viewpoints from non-academic actors.

This point has far-reaching consequences, for example that scientists give up their alleged knowledge monopoly. However, while doing so, methodologies needed to attain safeguarded construct and field validity and reliability, going beyond traditional scientific evidence and justifiable arguments (section 3.2.3).

This has been further elaborated in Chapter 4, linking proof and reasoning to the validity claims of Habermas' discourse ethics: truth; normative rightness; and truthfulness (section 4.2). Acknowledging that dialogues between stakeholders in different positions and with different values and interests are exposed to the dialectics of power relations requires an awareness that TDC syntheses and solutions presuppose (the heuristics of) an environment of hierarchy-free discourses. This is where the further development and application of TD methodologies and research principles, as described in Chapters 3 and 4, are essential but may be de facto very challenging (section 5.4). Spangenberg observes that if such conditions cannot be created, one should also seriously consider not applying the TD approach, or employing an exit strategy during the collaboration process.

The various presented cases in this volume shed light on essential conditions for TD and TDC success and for key challenges. As a first condition, methodological rigor may be essential. However, this is not a straightforward condition. The TD research principles also include flexibility and adaptivity as crucial elements. Various chapters exemplify some level of application of a standard set-up for TD projects (the six steps, derived from various authors in section 3.2, and further supplemented in section 5.4, including the ideas of Pohl and Hirsch Hadorn in Chapter 8). Yet, in other chapters the research set-up includes assigning different roles to researchers and stakeholders, which links to the institutional context that is addressed by a multi-level perspective of research organizations (as discussed in Chapters 3 and 5), like the capacity building project discussed in Chapter 7. Instead of pursuing methodological rigor with a fixed multi-step methodology, the articulation and institutional facilitation of the core principles and ethics of TD (sections 3.4 and 4.2) would probably be more essential than a strict steps-wise approach.

Another essential feature for TD/TDC success, highlighted in various chapters, is the joint activity of connecting integration of ideographic and nomothetic ways of knowing (sections 3.4.5, 5.3.2 and 8.3). Academic and non-academic stakeholders should jointly engage in this. This includes linking contextual and case-specific with abstract understanding in a holistic, yet not acquisitive manner. Co-producing knowledge will then enable multi-level learning across stakeholder groups and transform communities to curricula developers (sections 4.4 and 5.4.3).

This emphasizes the human resources angle in TD projects as a condition for success. Some chapters already referred to the different roles and required skills of researchers and TD facilitators. For the researcher, this means, among others things, reconciling to a certain degree with the role of a 'bricoleur' rather than insisting on being an expert in a specific field or discipline: 'the scientist creating events (changing the world) by means of structures and the "bricoleur" creating structures by means of events' (Lévi-Strauss, 1966, p. 22). Methodologically and normatively, a TD bricoleur challenges the supposed link of science with reality as ideological by allowing non-academic worldviews and values (signs) to gain weight in problem solving.

Concepts open possibilities while signs recycle previously available meanings. One way in which signs can be opposed to concepts is that whereas

concepts aim to be wholly transparent with respect to reality, signs allow and even require the interposing and incorporation of a certain amount of human culture into reality.

(*ibid.*, p. 20)

Yet co-production comprises not only academic researchers in TD projects, but also, as Chapters 5 and 6 point out, non-academic stakeholders who are involved as either problem-owners, agents for change or funders and enablers of TD processes. Human resources skill development includes cultivating a ‘TD attitude’, which is in Chapter 10 also described as ‘willingness to get out of one’s comfort zone’ and as ‘willingness to change’. This goes for both scientists and non-academic stakeholders, while the first should see themselves as an initiator of change in TD projects.

In an educational setting, academic teaching programmes need revision and adjustment to foster this attitude (Chapter 5, Chapter 6). TD scholars need to be able to initiate and coordinate processes of mutual acceptance of each other’s position (Chapter 4), and all participants in TD collaboration projects need to be willing and able to move towards co-producing common knowledge, identifying common good and perceiving common solutions (Chapter 8).

Several chapters in this volume illustrated institutional contextual conditions as a success factor. Creating an enabling environment by providing sufficient and adequately conditioned funding is e.g. essential for TD projects success (Chapters 5, 6 and 8). Funding requirements can cause administrative and organizational hindrances, which in the worst case leads to frustration and termination of projects for researchers active in remote research fields (Chapter 9). Another element connected to TD support and prospects is the management of expectations. The ambition of TD researchers is often to create impact in the real world through their projects. Some cases show clear evidence of this, like job creation and reduced environmental pollution (Chapter 9). However, in many cases, project results may merely be the start of a change in stakeholder groups (Chapters 6, 7 and 8) as well as in academia (Chapter 6). TD projects can be first steps for e.g. policy makers developing new approaches (Chapter 8), yet the slow pace of structural societal transformations has to be accepted. This can pose a dilemma in a world where TD approaches have been developed to meet current and pressing major persistent environmental challenges (section 2.3).

Yet, accepting the premise that multiple sources of knowledge contribute to a better understanding of the complexities of sustainability challenges raises many questions to be addressed, such as: can we consider all knowledge inputs as equally valuable, as well as when diverse conflict interest groups are included? The authors of Chapter 10 formulate this even more generically: ‘Who now holds the truth?’

This implies epistemological queries such as: what is the fundament on which TD researchers and non-academic stakeholders determine truth validity and how to maintain scientific authority? What are ideals and ideologies of different groups

of participants, e.g. the perception of TD as ‘wicked problems’, and how far are they projected to a team?

Further, from an ethical perspective: are all stakeholders evenly willing to adjust their views and beliefs? Section 5.4 mentions the risk that for powerful stakeholders, participation in TD projects can be a mere means to achieve traditional, patriarchal values that construct, mediate and maintain hegemonic forms of domination.

Current TD literature does not provide clear answers to these questions, and this volume cannot give ultimate responses, either. However, we have tried to trace an alternative way of approaching the questions. Currently, many TD concepts are fundamentally built on arborescent (‘tree-like’) thinking (Deleuze and Guattari, 1987), which is a common way for developing logical reasoning through linear, sequential reflection. Yet from the perspective of TD, this also implies that knowledge converges not along a pragmatic trajectory of common problem-solving space, but rather on a path of ‘true’ knowledge generation, thereby often remaining in splendid academic isolation. This is for example the case when presuming and applying classical binary opposites – true–false, normal–abnormal, useful–useless. Even if these dichotomies exist in real life, they do not necessarily mean the same for each stakeholder in a TDC team. Since academics tend to forget that discourses are based on negotiation with all its implications, rather than epistemic affordances, one recommendation for TD is to exercise arborescent thinking consciously and with care.

According to Deleuze and Guattari (1987), arborescent knowledge is methodologically generated through delineation:

All of tree logic is a logic of tracing and reproduction. . . . Its goal is to describe a de facto state, to maintain balance in intersubjective relations. . . . It consists of tracing,<sup>1</sup> on the basis of an overcoding structure or supporting axis, something that comes ready-made. The tree articulates and hierarchizes tracings; hierarchizes tracings; tracings are like the leaves of a tree). . . . The tree and root inspire a sad image of thought that is forever imitating the multiple on the basis of a centred or segmented higher unity.

(*ibid.*, pp. 12, 16)

In their opinion, a main weakness of the tree-like model is that when diversity meets structure, it is diminished by categories and laws of combination (*ibid.*, p. 6).

Deleuze and Guattari (1987) introduce the rhizome (literally: ‘rootstalk’, from Greek *rhízōma* ‘mass of roots’) as a counter model to traditional ‘empiricist’ or ‘rationalist’ arborescent worldviews by responding to the fact that non-scientific, lifeworldly views are essential to meaning creation. In the TD context, the rhizome can illustrate research that allows for various, scientific and non-scientific entry and exit points regarding interpretation, planning, development and evaluation. It also symbolizes the networking and connecting to stakeholders in the ‘real world’, where the search for useful knowledge requires digging into the

ground and getting dirty boots, as well as the need for an iterative approach (Chapter 3).

The rhizomatic principles of connection and heterogeneity (*ibid.*, 7) state that every point (here: meaning, things, policies etc.), as dissimilar as it might be, can be connected with every other point: ‘a rhizome ceaselessly establishes connections between semiotic chains, organizations of power, and circumstances relative to the arts, sciences, and social struggles’ (*ibid.*, 7).

The SDGs illustrate a rhizomatic network of such dynamic connections (lines) between entry and exit points comprising environments, citizens, governments, information and natural and artificial objects.

The multiplicity principle of the rhizome emphasizes the real-world nature of the multiple when creating connection-lines. As lines expand or shrink, the multiple gets new dimensions. Connections can get ‘interrupted or broken’: ‘a rhizome may be broken, shattered at a given spot, but it will start up again on one of its old lines, or on new lines’ (*ibid.*, 9). For example, in TDC projects, goals might change, and projects might even turn out to be a ‘failure’. From a rhizome perspective, this could invite researchers and stakeholders to follow up along one of the remaining ‘lines’ (see e.g. Chapter 8). Projects that by themselves may seem to have a small impact can lead to follow-ups and new initiatives at a different time and place and still yield results.

The map is a representation of the rhizome per se. It is open, connectable and performance-oriented, can be perpetually modified, reversed and reworked, and it has multiple entryways: ‘[The map . . .] coordinates are determined not by theoretical analyses implying universals but by a pragmatics composing multiplicities or aggregates of intensities’ (*ibid.*, p. 15).

Deleuze and Guattari introduced the rhizome as an alternative way of thinking which allows pragmatically approaching alliances: ‘the rhizome is alliance, uniquely alliance. The tree imposes the verb “to be” but the fabric of the rhizome is the conjunction, “and . . . and . . . and . . .”’ (*ibid.*, 25). The rhizome connects any point to any other point; it allows the introduction and alignment of heterogeneous signs within various dimensions. It is a multiplicity with no beginning or end, made only of lines which can be disrupted as dimensions change in nature, which in the context of TD research illustrates the iterative approach.

For TD, the concept of the rhizome symbolizes that acknowledging epistemological otherness, rather than trying to fit the ‘savage mind’ (Lévi-Strauss, 1966) in purposive rationality schemes (see Chapter 1), is a necessary condition for co-producing future knowledge. Academic thinking is seen as a powerful source for developing heterarchical methods of knowledge generation, which are closer to practice, experience and everyday life. This development can be an important start for comprehensive TD philosophies of sciences. Practically, it can lead TD towards identification of internal dilemmas between transdisciplinary necessities and disciplinary limitations, thereby developing new converging concepts for collaboration with different societal stakeholders. Considering this, this book in many ways embodies a rhizome itself, with its various ambitions of TD, entries, approaches and methodologies.

## Note

- 1 The English translation misses out the difference between tracing (French: 'le tracé') and trailing (French: 'la trace'). 'La trace' means 'trail' while 'le tracé' has a polysemiotic meaning, among others, 'route', 'layout', 'delineation', 'alignment', 'trail' and 'plot' (Linguee, Dictionary French–English 2020).

## References

- Deleuze, G. and Guattari, F. (1987) *A Thousand Plateaus*. Minneapolis: University of Minnesota Press.
- Herrero, P., Dedeurwaerdere, T. and Osinski, A. (2019) 'Design features for social learning in transformative transdisciplinary research', *Sustainability Science*. Springer Japan, 14(3), pp. 751–769. doi: 10.1007/s11625-018-0641-7.
- Jantsch, E. (1972) 'Inter- and transdisciplinary university: A systems approach to education and innovation', *Higher Education Quarterly*, 1(1), pp. 7–37. doi: 10.1111/j.1468-2273.1947.tb02067.x.
- Lang, D. J. et al. (2012) 'Transdisciplinary research in sustainability science: Practice, principles, and challenges', *Sustainability Science*, 7(S1), pp. 25–43. doi: 10.1007/s11625-011-0149-x.
- Lévi-Strauss, C. (1966) *The Savage Mind*. Chicago, IL: University of Chicago Press.