# Supplementary Material

## Suppl. Material A: Additional information regarding the climate mainstreaming theory and approach

### Definitions

Climate mainstreaming relates to both long-term, forward-looking activities to increase resilience, and responses that address risks and hazards arising from the current climate. Such activities are also found in disaster risk reduction ([UNISDR, 2009](https://www.sciencedirect.com/science/article/pii/S0959378015300674#bib0440)). Here, *hazard* refers to the occurrence of a (natural or human-induced) physical event, trend or impact that may negatively affect human life, health, or things that humans value ([IPCC, 2014](https://www.sciencedirect.com/science/article/pii/S0959378015300674#bib0205)). Climate *risk* is conceptualised as the interaction between climate change, hazards and societies that are vulnerable to their impact ([UNISDR, 2009](https://www.sciencedirect.com/science/article/pii/S0959378015300674#bib0440); Wamsler, 2014). Risk, therefore, relates to underlying patterns of climate change and associated vulnerabilities. They can manifest at individual, collective, organisational and/or systems level, and include both internal (e.g. mental models, values, beliefs, worldviews) and outer (e.g. physical, social, economic, environmental, institutional context) aspects.

### Historical development of climate mainstreaming

The climate mainstreaming concept has two, principal origins. One strand has developed from disaster risk reduction mainstreaming, which has had widespread support since the World Conference on Disaster Risk Reduction in Kobe, Japan in 2005 (UNISDR, [2005](https://link.springer.com/chapter/10.1007/978-3-319-56091-5_15#CR43)), and which itself builds on transformation and mainstreaming theories and experience in cross-cutting domains such as HIV/ Aids and gender (Daly, [2005](https://link.springer.com/chapter/10.1007/978-3-319-56091-5_15#CR12); Holden, [2004](https://link.springer.com/chapter/10.1007/978-3-319-56091-5_15#CR18); Mazey, [2002](https://link.springer.com/chapter/10.1007/978-3-319-56091-5_15#CR27)). The second has its roots in environmental policy integration (UN, [1987](https://link.springer.com/chapter/10.1007/978-3-319-56091-5_15#CR47); Lenschow, [2002](https://link.springer.com/chapter/10.1007/978-3-319-56091-5_15#CR24); Van Asselt et al., [2015](https://link.springer.com/chapter/10.1007/978-3-319-56091-5_15#CR49)) and, more specifically, climate policy mainstreaming, which has been promoted since around 1997 (Collier, [1997](https://link.springer.com/chapter/10.1007/978-3-319-56091-5_15#CR9)). Initially, climate policy mainstreaming aimed to integrate the objective of reducing greenhouse gas emissions into other sectoral policies. Over time, the focus has broadened and it now also explicitly includes adaptation considerations (Berkhout et al., [2015](https://link.springer.com/chapter/10.1007/978-3-319-56091-5_15#CR6)).

The mainstreaming framework has been developed as a response to the limits and insufficiencies of prior approaches, notably the siloed and fragmented way that mitigation, adaptation and sustainable development have been practiced, and how their principles have been applied in cities worldwide (see Wamsler, 2014 and Runhaar et al., 2018 for an overview). Based on sustainability and systems thinking, it is plugged into the whole ‘enterprise’ of development and therefore has the potential to be scaled effectively.

### Key features\*

First, at the local level, increasing resilience (through adaptation mainstreaming) requires the active consideration and combination of four different types of measures to reduce climate risk on-the-ground. If possible, these measures should be multi-purpose, and thus not only focus on reducing climate risk.

Second, to ensure the sustainable implementation of these measures, they need to be linked to different mainstreaming strategies at the local, institutional and inter-institutional level.

Third, put together, these measures and strategies have the potential to foster resilience by challenging common attitudes and paradigms at multiple levels of governance. (This means that they can work together in a way that changes (or at least challenges) current attitudes and paradigms.)

### Design principles\*

Different design principles can be extracted from the framework:

First, when we design projects, we have to include and combine all four measures if we want to comprehensively reduce risk and create redundancy (Figure 1): (1) hazard reduction and avoidance, (2) vulnerability reduction, (3) preparedness for response, and (4) preparedness for recovery. If we take the example of a new development, for instance a park, all four types of measures could be easily addressed: (1) Its location can be chosen specifically to prevent people moving into a risk area and to reduce hazard exposure of the surrounding settlements. (2) At the same time, its design can include elements, such as ponds, skate parks, playgrounds, etc. that can serve as water retention areas. (It can also include grey, green and blue elements that provide cooling during hot weather, or protection during heavy rain.) (3) Elevated platforms can be designed to prepare for temporary shelter during response or (4) recovery phases. And the park can be designed to display information to increase awareness of different risk-reducing activities.

Second, in order to address risk comprehensively and create redundancy, for each type of measure we need a combination of activities that address related physical, environmental, social and economic aspects of risk, through a combination of grey, green and soft solutions. Only addressing physical risk through grey solutions is certainly not enough, and might even lead to increasing risk levels. At the same time, physical measures can become an important entry point for reducing broader, socio-economic vulnerabilities, for instance by linking them to professional training and economic activities that support those most vulnerable.

Third, we need to design activities that are not only multi-hazard, but also multi-purpose. Solutions that deliver additional benefits are crucial, especially given the increasing urban challenges, conflicting priorities, the resultant difficulty of financing climate adaptation, and the need to increase urban actors’ willingness to implement measures. We know that adaptation measures can, for instance, be designed to simultaneously enhance biodiversity, improve environmental quality, contribute to economic activities, and support social well-being. For instance, green, nature-based solutions. Or an example of a multi-purpose grey measure would be a sea wall that is also a recreational bike path. Or a skate park that is, at the same time, a water retention area.

But sustainable change will remain elusive as long as our understanding of mainstreaming remains naïve. Organisations themselves also need to change, rather than simply ‘mainstreaming’ change in selected, on-the-ground measures. All of the above examples apply at the local (or operational) level. But if we want to ensure their sustainable implementation there must also be changes at the institutional and inter-institutional levels in order to:

* Institutionalise adaptation so that its mainstreaming at local level becomes standard procedure – including the creation of mechanisms and structures for monitoring and learning;
* Ensure that organisations themselves can continue to function in times of climate change/impacts;
* Cooperate in creating a multilevel governance system for climate adaptation; and
* Drive improved education and science–policy integration on adaptation and mainstreaming.

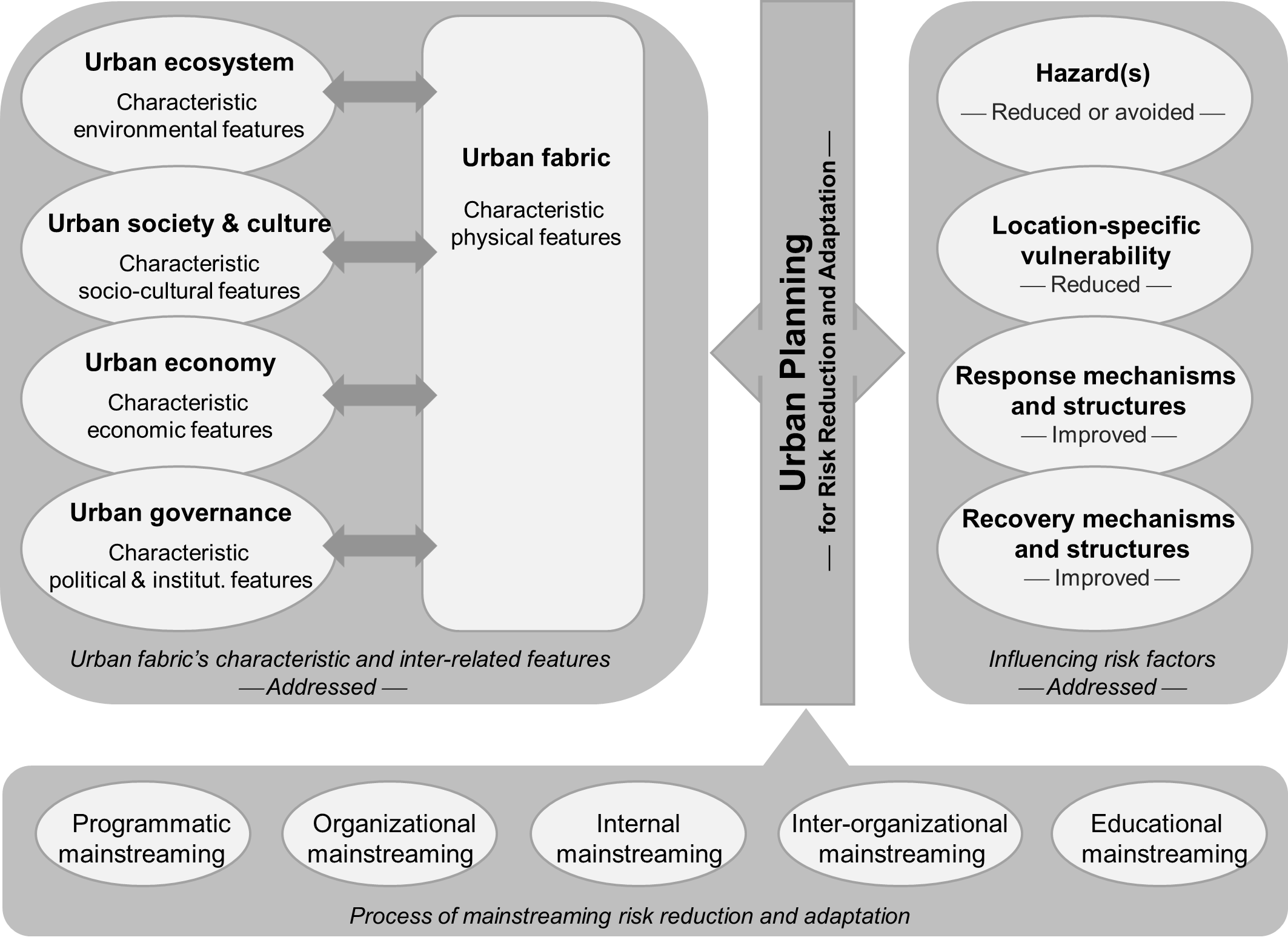
This makes a total of six mainstreaming strategies that operate at three levels.

If we formulate them into a design principle, it means that we have to design and implement local measures in such a way that they are supported by, and linked to all levels of mainstreaming. There are many good examples of this in different places. What they have in common is that they find innovative ways for linking socio-economic and physical risk reduction on the ground with improving organisational structures, cooperation mechanisms and planning frameworks at multiple levels. One aspect, which in this context is however often not given enough attention, is the importance of involving citizens.

It is thus important to add another design principle, which is: the need to put people in the centre, and to match different actors’ views, efforts and capacities. This also includes the consideration of people’s inner dimensions and existing power structures to ensure the adequate involvement of the most vulnerable members of society.

This shows that adaptation mainstreaming is inherently linked to the concept of resilience, because it ultimately aims to challenge common ideas, attitudes, or activities and change dominant paradigms at multiple levels of governance (including the root causes of risk). Mainstreaming works, for instance, toward resilience by expanding the focus – from preventing (or resisting) hazards – to a broader systems framework in which we learn to live and cope with an ever-changing, and sometimes risky, environment. (protection paradigm – false sense of security). It should also lead to a more inclusive planning and (complementary) risk governance system. And this, in turn, translates into the ability to change in response to altered circumstances, and to carry on functioning even when individual parts fail.

\*Note: The summary of key features and design principles is based on Wamsler (2017) and Wamsler & Raggers (2018).



***Figure 1:*** *Mainstreaming into urban governance and planning (simplified), from Wamsler (2014)*

### Operational tools/guidelines for climate mainstreaming that are directly linked to the presented theory

* Guidelines for integrating/mainstreaming climate change consideration into municipal planning and governance (English, German, Swedish): <https://portal.research.lu.se/en/publications/integrating-climate-change-adaptation-into-municipal-planning-and>
* Guidelines for integrating/mainstreaming nature-based solutions/ ecosystem-based approaches into municipal planning and governance (English, Swedish): <https://portal.research.lu.se/en/publications/promoting-nature-based-solutions-guideline-for-integrating-ecosys>
* Guidelines and principles for integrating/mainstreaming climate change considerations for both organisations and citizens working in the fields of sustainability and/or climate change (Swedish): <https://portal.research.lu.se/en/publications/gemensam-klimatanpassning-principer-f%C3%B6r-h%C3%A5llbar-samverkan-mellan->
* Operational framework for integrating/mainstreaming climate change/risk considerations for aid organisations, summary (English): <https://portal.research.lu.se/en/publications/operational-framework-for-integrating-risk-reduction-and-climate->
* Operational framework for integrating/mainstreaming climate change/risk considerations for aid organisations (English, Spanish): <https://portal.research.lu.se/en/publications/operational-framework-for-integrating-risk-reduction-for-aid-orga>
* For further tools see Wamsler (2014).

## Suppl. Material B: Additional information regarding the conscious full-spectrum theory

### Historical development of the conscious full-spectrum theory and approach

Whilst the conscious full-spectrum framework has been mainly developed as a response to the limits and insufficiencies of prior approaches, trying to add a transformative direction to change work, it is today applied more broadly in leadership contexts (Sharma, 2018).

### Methods and tools that are directly linked to the presented theory

The following principles guided, amongst other things, the development of associated processes, methods and tools:

* All methods/ tools/ templates/ exercises are based on: i) self-enquiry, ii) insight, and iii) practice (constant application and reiteration to activate what is learned and apply it in a practical way).
* These three aspects should be present in any sustainability project (embodied learning).
* The basic foundation for self-enquiry, insight and practice is stillness because scientists estimate that around 95% of what happens in our brains is beyond conscious awareness (Mlodinow, 2013).
* The methods/ tools/ templates/ exercises are drawn from different academic disciplines and fields (e.g. applied psychology, social neuroscience, leadership), and have been adapted to the context of sustainability.
* In this context, ‘sourcing inner capacity is not related to specific areas of expertise; it is a way of being’ (Sharma, 2017, p. 49).
* In her book, Sharma (2018) presents different complementary methods, tools and templates related to:
  1. ***Sourcing inner capacity and potential for supporting transformation*** – through ‘following six steps to knowing who I am’ (Chapter 5, pp. 45-63), ‘embracing ‘identities’ as assets’ (Chapter 5, pp. 63-73), ‘bridging our nondual and dual worlds’ (Chapter 5, pp.74-80), and ‘being a paradigm shifter’ (Chapter 5, pp.80-85).
  2. ***Designing differently to support transformation*** – through designing ‘conscious full-spectrum responses’ (Chapter 6, pp. 96-119), applying ‘synergistic operational strategies’ (Chapter 6, pp. 120-136) and ‘transformational results chains’ (Chapter 6, pp. 136-156), as well as scaling related efforts for radical systems change (Chapters 9-11) – by simultaneously ‘responding to challenges and realising full potential’ (Chapter 9, p. 216), and ‘interrupting exclusionary isms’ (Chapter 9, pp. 219-226).
  3. ***Implementing change*** – through implementing a combination of the above-mentioned tools as well as through practicing ‘being in action’ (Chapter 7, pp. 157-159), implementing ‘everyday actions of mindful stewards, leaders, and managers’ (Chapter 7, pp. 159-184, see also ‘The Integrity Lens’, p. 180), ‘communicating with awareness’ (Chapter 7, pp. 184-194), ‘being a mindful implementer’ (Chapter 7, pp. 194-202), and scaling related efforts for radical systems change (Chapters 9-11) – by improving ‘capacity development’ (Chapter 10, pp. 235-241), ‘measurement’ (Chapter 10, pp. 241-250), supporting ‘new narratives for new systems and norms’ (Chapter 11, pp. 250-266), ‘the establishment of constellations’ (Chapter 10, pp. 266-275) and tapping into other opportunities for transformation (Chapter 11, pp. 277-299).

## Suppl. Material C: Additional information regarding the integrative framework for conscious full-spectrum mainstreaming

### Illustrative examples and nuggets/entry-points for mutual mainstreaming of climate change and internal dimensions in sector policy and practice

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| --- | --- |
| Strategy VI – educational mainstreaming  Internal or personal level/sphere (individual and collective) | Integration of sustainability and climate change considerations in education across disciplines/sectors (school, professional education, leadership and adult development) by: i) adopting an integrated approach that also addresses underlying root causes (internal dimensions/mindsets); and ii) putting increased emphasis on vertical (as opposed to horizontal) learning. This involves the strengthening of transformative capacities/qualities – relational being, thinking and acting – to support agency and equitable transformation – e.g. through the described methodology and methods, and related practice-based learning that is linked to concrete climate actions (see below).  Provision of transformative spaces for improving climate negotiations/collaboration and creating conditions for emergence – e.g. in the form of safe ‘containers’ for self-reflection and enquiry into the role of internal dimensions for sustainability and climate change, and one’s relationship to self, others and the world at large (e.g. intrinsic values, linkages to dominant social paradigms, human-nature connectedness).  Creation of learning platforms for climate change (e.g. exhibitions, networks, communities of practice) to inspire and co-create new sustainability imaginaries/narratives/paradigms. |
| Strategies III–V – (inter-) organisational and internal mainstreaming  Systems/ structures at institutional and interinstitutional level – political sphere | Revision of educational policies and national teacher training standards to support sustainability education and make the above-mentioned changes a legal right for all citizens (see under educational mainstreaming, first bullet point).  Revision of organisations’ mission statements regarding sustainability to support the idea that individual and planetary wellbeing as intrinsically related and central to the organisation’s actions/portfolio.  Revision of regional, national or local performance frameworks by integrating capacities and values such as kindness and compassion as explicit aims/criteria (versus economic growth and/or a pure focus on CO2 reductions).  Revision of project planning and management processes and tools, such as results-based/logical framework approaches, by using internal dimensions (intrinsic capacities and values) as the underpinning factor for defining climate-related inputs, outcomes, outputs, and impacts. Revision of related monitoring and evaluation tools, by also considering the aspect of emergence.  Support of transformative spaces within organisations to challenge current, unsustainable mechanism, structures, systems and paradigms (see also above under educational mainstreaming). |
| Strategies I/II – add-on and programmatic mainstreaming  Local level – practical sphere | Creation of citizen climate cafés, local climate councils and counselling where citizens can express their concerns and emotions related to climate change (e.g. fears, eco-anxiety) and have the opportunity to engage in meaningful public-private collaborations.  Creation of local knowledge platforms for the recognition and inclusion of local, traditional and/or indigenous knowledge systems, perspectives and approaches in decision-making to challenge current, unsustainable approaches/paradigms/narratives.  Improvement of project-related climate communication and environmental campaigning in a way that links climate change to other societal crises, and addresses related internal dimensions, e.g. by sourcing intrinsic values (in oneself and those addressed), and supporting agency, courage, hope and optimism versus climate anxiety and denial. |

Source: Adapted from Wamsler & Bristow (2022) and Wamsler (2014). Note: The terms institution and organisation are used interchangeably in this framework.

### Definitions and overview of the five clusters of transformative qualities/capacities – short version

The term transformative qualities/capacities refers to cognitive, emotional and relational qualities/capacities that have the potential to support sustainable development and transformation. They influence how people relate to themselves, others, the environment and future generations. They find expression in individual and collective values, beliefs, worldviews and paradigms that support more relational being, thinking and acting that links individual and planetary wellbeing, flourishing and regeneration (Wamsler et al., 2021). See also below the Figure of the Inner-Outer Transformation Model.

#### **Transformative qualities/capacities**

**1) Awareness: The ability to meet situations, people, others and one’s own thoughts and feelings with openness, presence and acceptance.**

This cluster encompasses qualities/capacities such as presence, attention, self-awareness and self-reflection, psychological/ cognitive flexibility and resilience. These are, in turn, related to qualities such as equanimity, discernment, authenticity, the capacity to listen and communicate, and openness to change.

**2) Connection**: **The ability and desire to see and meet oneself, others and the world with care, humility and integrity, from a place of empathy and compassion.**

This cluster includes qualities/capacities such as compassion (to both humans and the environment), empathy, kindness, gratitude and generosity.

**3) Insight**: **The ability to see, understand and bring in more perspectives for a broader, relational understanding of oneself, others and the whole.**

This cluster extends to qualities/capacities such as perspective-taking, relational awareness, integral, equitable thinking and the integration of different ways of knowing. There are close links to the qualities of humility, optimism, and hope.

**4) Purpose**: **The ability to navigate oneself through the world, based on insights into what is important (intrinsic, universal values).**

This cluster encompasses qualities/capacities such as the activation and reflectivity of one’s values, sense of purpose, intentions and responsibility, future orientation, intrinsic value orientation and associated senses of reciprocity, equity, fairness and solidarity.

**5) Agency: The ability to see and understand broader and deeper patterns and our own role in the world in this regard, and to have the intention, optimism and courage to act on it.**

This cluster refers to a sense of empowerment and related qualities/capacities that can foster and enhance cooperation, the co-creation of meaning and action. There are close links to qualities such as courage, creativity, passion, perseverance, optimism, and hope.

Source: Adapted from Wamsler et al. (2021). See Suppl. Material F of Wamsler et al. (2021) for the full list of potential transformative qualities/capacities and related intermediary factors.

### Inner-Outer Transformation Model – Relevance of transformative qualities/capacities for inner-outer transformation for sustainability



Source: Inner–Outer Transformation Model, illustrated in Suppl. Material E of Wamsler et al. (2021). See in-text figure 1 in Wamsler et al., 2021 for a more detailed version of the model. Note: The model provides a roadmap for systematic research, policy and practice that integrates inner and outer transformation. The classification into internal and external (inner/ outer), which marks the boundary between what is ‘inside’ (a subject) and what is ‘outside’ (a subject), is artificial and applied for simplicity. Internal dimensions, such as values, beliefs, worldviews and paradigms are for instance inter-subjective (e.g. socially defined) and qualities/ capacities are enacted (e.g. cultivated and expressed in relationship to other subjects and the world at large). The continuum of sustainability outcomes relates to all levels of change (consciousness, culture, behaviour, systems) and the associated spheres of transformation (personal, practical, political) (Wilber, 2005; O’Brien & Sygna, 2013).

### Existing online collections of guidelines, methods, tools and exercises that aim to link inner and outer dimensions and transformation

* <https://innerpathways.eu/tools/curriculum/>
* <https://hostingtransformation.eu/toolbox/>
* <https://workthatreconnects.org/resources/about/>
* [https://www.unfpa.org/sites/default/files/pub- pdf/Step\_Up\_A\_Pocket\_Guide\_to\_Social\_Change\_for\_Young\_Leaders.pdf](https://www.unfpa.org/sites/default/files/pub-%20pdf/Step_Up_A_Pocket_Guide_to_Social_Change_for_Young_Leaders.pdf)
* See also under <https://www.contemplative-sustainable-futures.com/> for an updated list and examples of transformative education and leadership approaches.

# References

Van Asselt, H., Rayner, T., Persson, Å. (2015). Climate policy integration. In: Bäckstrand, K., Lövbrand, E. (eds.). *Research handbook on climate governance*. Edward Elgar.

Berkhout, F., Bouwer, L., Bayer, J., Bouzid, M., Cabeza, M., Hangerm S., Hof, A., Hunterm P., Meller, L., Patt, A., Pfluger, B., Raynerm, T., Reichardt, K., van Teeffelen, A. (2015). European policy responses to climate change: Progress on mainstreaming emissions reduction and adaptation. *Regional Environmental Change, 15*:949–959.

Collier, U. (1997). Sustainability, subsidiarity and deregulation: New directions in EU environmental policy. *Environmental Pollution, 6*(2):1–23.

Daly, M. (2005). Gender mainstreaming in theory and practice. *Social Policy, 12*(3):433–450.

Holden, S. (2004). *Mainstreaming HIV/AIDS in development and humanitarian programmers*. Oxfam.

IPCC. (2014). Annex II: Glossary. [Agard, J., Schipper, J., Birkmann, M., Campos, C., Dubeux, Y., Nojiri, L., Olsson, B. Osman-Elasha, M., Pelling, M.J., Prather, M.G. Rivera-Ferre, O.C., Ruppel, A., Sallenger, K.R., Smith, A.L. St Clair, K.J., Mach, M.D. Mastrandrea, and T.E. Bilir (eds.)]. In: IPCC [V.R. Barros, V., Field, C., Dokken, D., Mastrandrea, M, Mach, K., Bilir, T., Chatterjee, M., Ebi, K., Estrada, Y., Genova, R., Girma, B., Kissel, E., Levy, A., MacCracken, S., Mastrandrea, P., White, L. (Eds.)]. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.

Lenschow, A. (ed.). (2002). *Environmental policy integration: Greening sectorial policies in Europe*. Earthscan.

Mazey, S. (2002). Gender mainstreaming strategies in the E.U.: Delivering on an agenda?. *Feminist Legal Studies, 10*(3), 227-240.

Mlodinow, L. (2013). *Subliminal: How your unconscious mind rules your behavior*. Vintage press.

O’Brien, K., Sygna, L. (2013). Responding to climate change: The three spheres of transformation*. Proceedings of transformation in a changing climate, 16*, 23.

Runhaar, H., Wilk, B., Persson, Å., Uittenbroek, C., Wamsler, C. (2018). Mainstreaming climate adaptation: Taking stock about ‘what works’ from empirical research worldwide. *Regional environmental change*, *18*(4), 1201-1210.

Sharma, M. (2017). *Radical transformational leadership: Strategic action for change agents*. North Antlantic Books.

UN (1987). *Our common future – Brundtland report*. United Nations, Oxford University Press.

UNISDR (2005). *Hyogo framework for action 2005–2015: building resilience of nations and communities to disasters*. World conference on disaster reduction, Kobe, Hyogo, Japan.

UNISDR (2009). Terminology on disaster risk reduction. *UNISDR Online Glossary*. <https://www.unisdr.org/we/inform/terminology#letter-r>.

Wamsler, C. (2014). *Cities, disaster risk, and adaptation*. Routledge.

Wamsler, C. (2017). *Dean’s lecture series 2017 – Christine Wamsler*. Retrieved 2022-05-23 from [www.youtube.com/watch?v=jqF904qQhTA](http://www.youtube.com/watch?v=jqF904qQhTA).

Wamsler, C., Bristow, J. (2022). At the intersection of mind and climate change: Integrating inner dimensions of climate change into policymaking and practice. Climatic Change. Forthcoming.

Wamsler, C., Raggers, S. (2018). Principles for supporting city-citizen commoning for climate adaptation: From Adaptation governance to sustainable transformation. *Environmental Science and Policy, 85*:81–89.

Wamsler, C., Osberg, G., Osika, W., Hendersson, H., Mundaca, L. (2021) Linking internal and external transformation for sustainability and climate action: Towards a new research and policy agenda. *Global Environmental Change 71*, 102373

Wilber, K. (2005). Introduction to integral theory and practice. *AQAL: Journal of Integral Theory and Practice, 1*(1), 2-38.