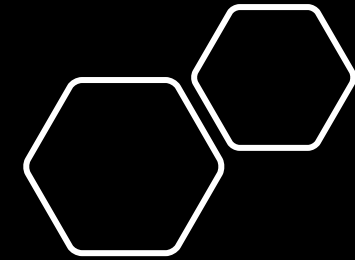




Dr Tom Campbell

Sustainable trails: a holistic approach





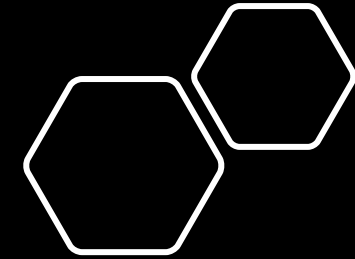
What is a
sustainable
trail?

Definition and Operationalisation

We asked the following question as part of our research study into mountain bikers' attitudes, behaviours and motivations:

What do you consider to be a sustainable trail?

1555 mountain bikers provided a free text response.



What is a
sustainable
trail?

Many things, to many people

Content analysis of the question, “What do you consider to be a sustainable trail?” (n = 1555).

Trail Focussed Sustainability		
Category	Codes	Frequency
Durability (n = 479)	All weather	105
	Long lasting	105
	Withstands traffic volume	97
	Durable/robust/armoured surface	61
	Resistant to damage	57
	Well built	53
Construction (n = 618)	Natural materials	139
	Local Materials	115
	No/Limited machine use	70
	Natural features	47
	Drainage	244
Maintenance (n = 242)	Low maintenance	126
	Well or regular maintenance	74
	Easily maintained	29
	Sensible gradient	47
User experience (n = 93)	Fun	18
	Safe	16
	Flow	8
	Multiuse	4
Design Features (n = 123)	Minimises trail creep/keeps users on the trail	69
	Speed and braking control	36

Wider Sustainability		
Category	Codes	Frequency
Environment and nature (n = 720)	Minimises Impact on wider environment	189
	Reduces erosion	170
	Prevents damage to flora and fauna	147
	Protects wildlife	85
	Minimal digging or removal of trees/roots.	77
	Avoids sensitive and wet areas	46
Landscape and terrain (n = 159)	Returns to nature after use	6
	Integration with nature and landscape	83
	Sympathetic to/makes use of landscape or terrain	55
	Minimal impact on landscape	21
	Cleaning no litter	21
Facilities (n = 90)	Ease of access	34
	No motorised vehicles	17
	Signage	18
Socio-economic (n = 91)	Minimal impact on other users	38
	Economically sustainable or beneficial	15
	Benefits to local community	13
	Designed, built, or maintained in collaboration with community/stakeholders	25

Campbell et al. (2021)

The Three “E”lements of Sustainability

Responses covered the three pillars of sustainability.

The IMBA Guidelines for a quality trail experience highlights the importance of considering all three for planning and decision making but acknowledges that the social (equity) aspect is often overlooked.

Approximately 70% of responses focused on environmental aspects with only 10% citing social or economic factors.



Trails are physically located within the environment and exist as tangible and visible artefacts.

As a relative newcomer to the outdoors, there was initially a desire to demonstrate the impact of mountain biking on the environment to justify our presence in the outdoors. Often relative to other users.

Early sustainability paradigms were predominantly anthropocentric in nature and focused largely upon improving efficiency, reducing harm, and mitigating (human) damage to the environment.

Much of the current knowledge base regarding trail sustainability has emerged from research focussing upon the impact of trail use upon soils, although environmental impact can extend to wider ecological components including vegetation disturbance of wildlife.



The evidence base

It is relatively well established that all trail-based activities cause a degree of degradation of soil, with the effect generally being curvilinear and moderated by an interaction between environmental factors, user type and user behaviour.

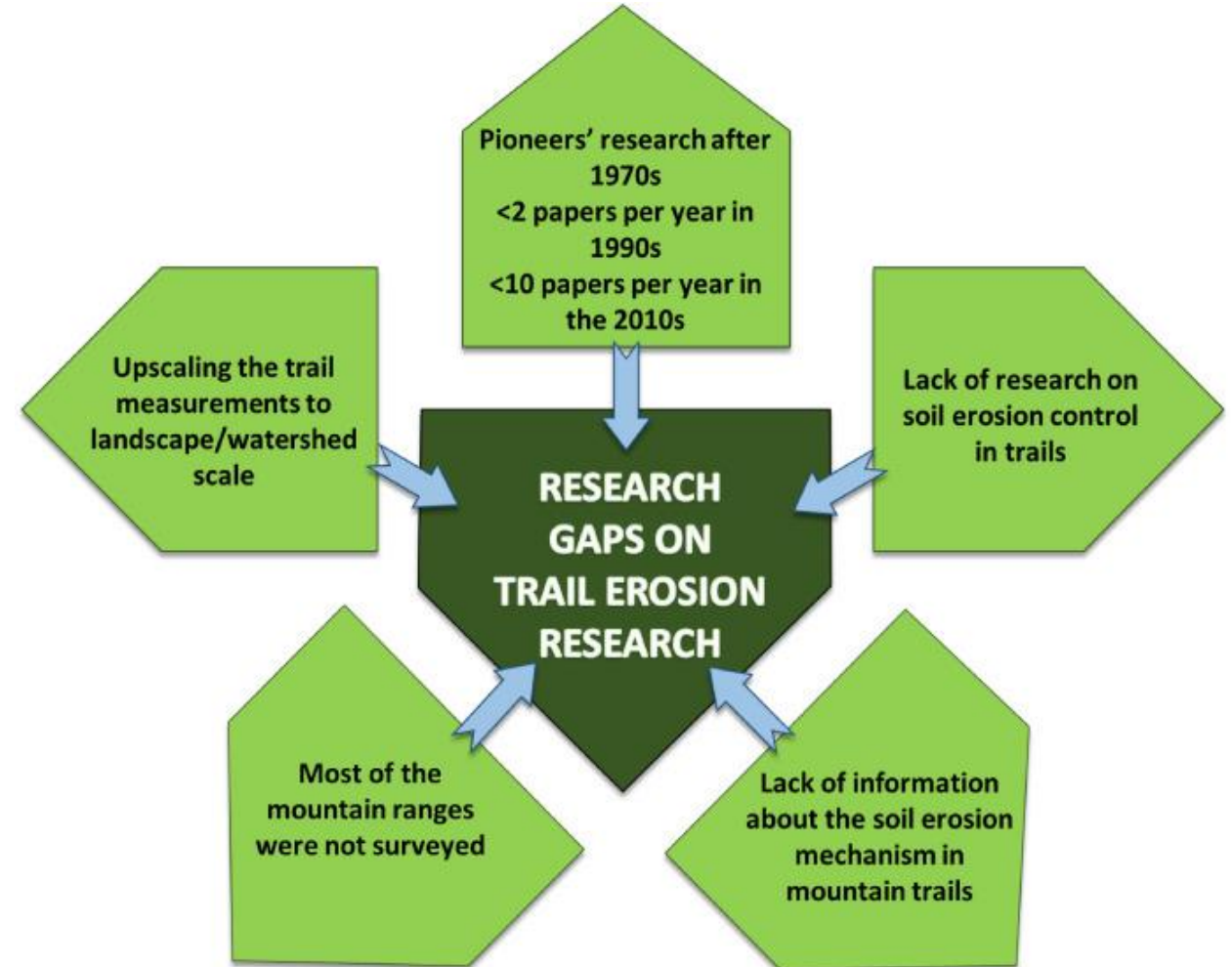
The impact of mountain biking upon soils and vegetation has generally been shown to be equivalent to that of hikers and significantly less than that occurring from equestrian or motorised vehicular use.

Trails that include high grades and low slope alignments are generally associated with greater damage as is inadequate drainage or being located within wet areas.

Less studied are trail-related impacts to water quality.

Land management agencies have rarely funded the types of trail science studies needed to develop, refine, or validate trail sustainability BMP guidance, instead supporting more applied studies to inventory trails and assess trail conditions (Marion 2023)

Limitations (Soil Research)



(Salesa & Cerdà, 2020)

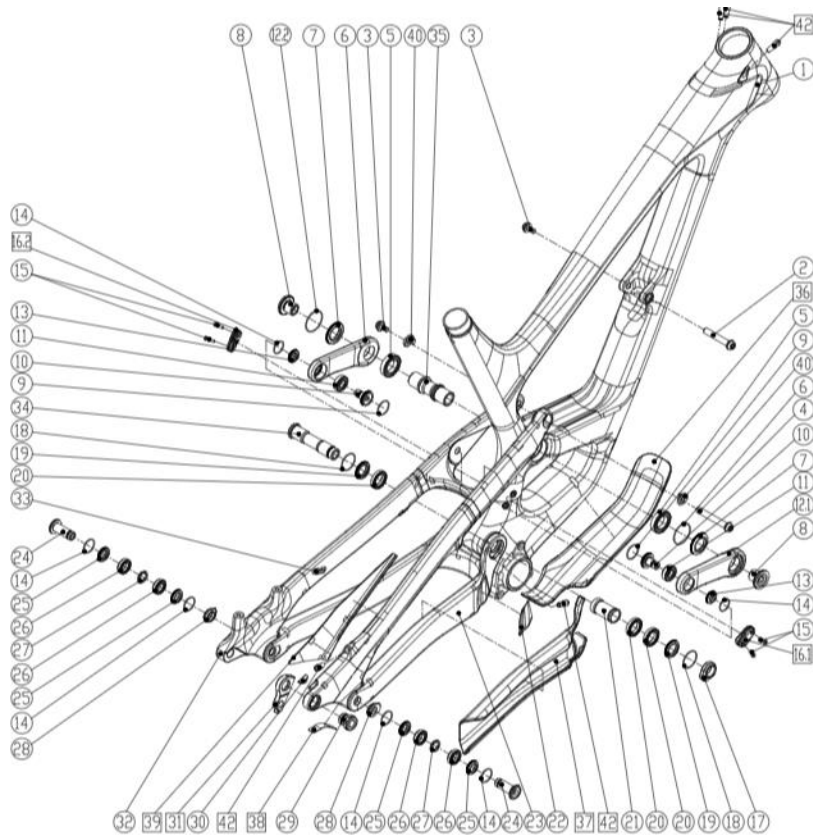
Wider (theoretical) Limitations/Challenges

- There is a lack of longitudinal research
- Carrying capacity seldom established
- Focus on measurement and description but lacking in potential approaches to mitigation
- Human behaviour often not included
- The aim should be to improve the user experience and allow a sustainable human-nature connection.
- Reductionist approach often measuring variables in isolation



Reductionism v Holism

- Reductionism may prevent scientists from recognizing important relationships between components or organisms in their natural settings, appreciating the evolutionary origins of processes and organisms
- Scientists, for the most part, don't know how to do holistic research. They are trained and rewarded for doing reductionistic science. Reductionistic studies generally don't help solve sustainability problems because such studies are too narrowly focused, and humans are often not considered.
- Answering a reductionist question about a phenomenon that may contribute to sustainability may be helpful, but in the end, reductionism alone cannot answer sustainability questions.



Holism

Considers ecosystem properties from a “top down” view, and thus is more holistic in nature.

Does not simply attempt to *prove* the effect of an independent variable on a dependent variable. Instead, the objective is to see how an ecosystem responds under a variety of conditions that could occur at the study site, not just those that existed at the time of the study.

We experiment with the model, changing one variable at a time, to see how changing them affects the range of outcomes that could occur at the study site. It also tells you what variable affects the prediction most, and what research must be taken next to improve your understanding. It is didactic. Most important, it keeps the researcher focused on the question that prompted the study in the first



Image credit P Lockhart

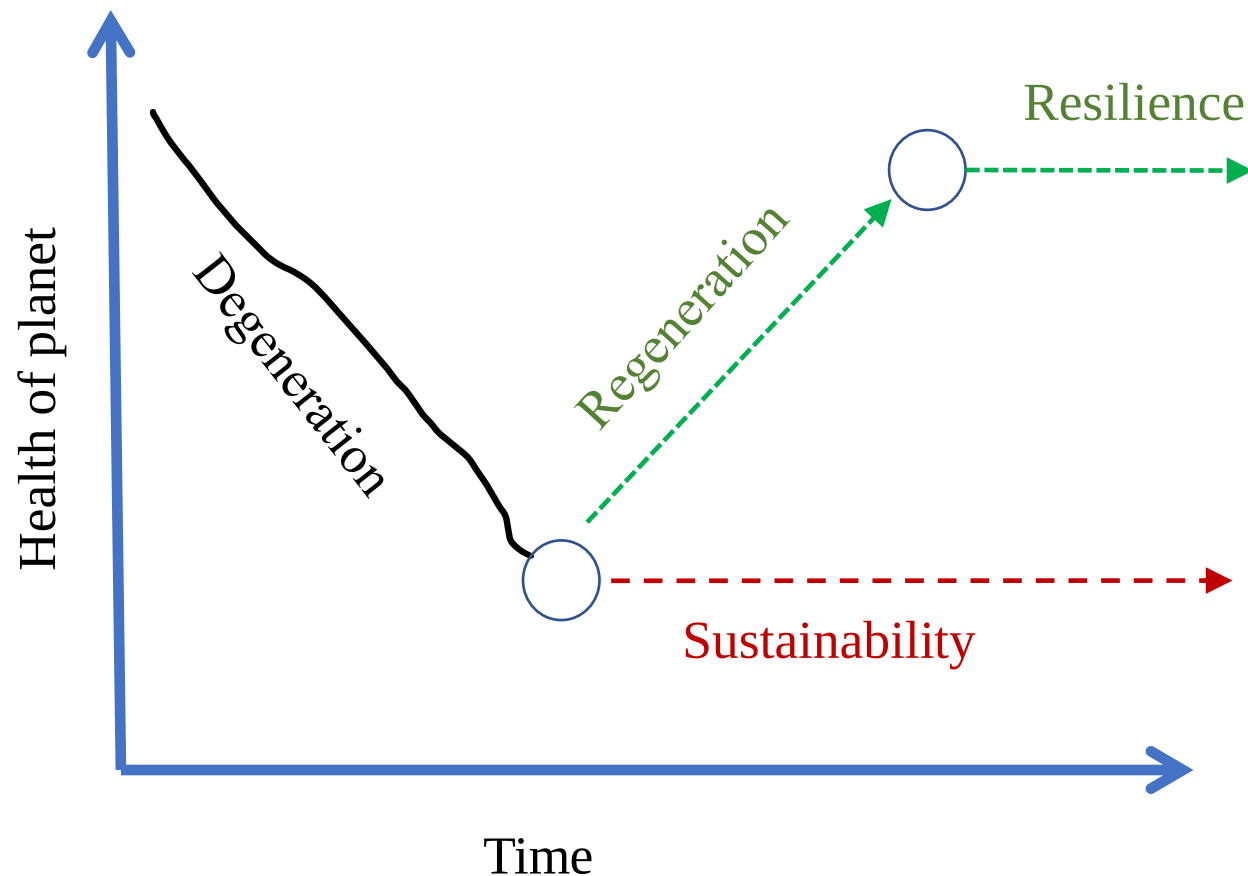
- **Rider behaviours** are arguably the most important determinant of the ecological impact of trail use and therefore need to be fully understood in order to progress the discourse of sustainable trails
- **Unauthorised trail building** has always been part of mountain bike culture but with growing numbers of riders the potential for negative impacts increases.
- While purpose-built trail centres and bike parks can divert mountain bikers away from more sensitive areas thereby protecting ecosystems and reducing conflict (Taylor and Sand, 2021) they **may not satisfy all riders' appetite for natural technical trails.**
- The proliferation of unauthorised trail building during the Covid Pandemic supports the notion that **mountain bikers desire certain types of trails and will create them where they don't currently exist.**

Table 4. Frequency and rationale for riding unauthorised trails (n = 3255).

	Total	DK	FR	DE	IT	NL	NO	CH	UK
Frequency									
Never	26.3	44.9	15.6	7.7	27.1	31.3	39.5	12.69	19.9
Occasionally	36.7	42.1	50.3	34.1	35.8	50.0	24.4	52.79	31.6
Often	21.3	5.8	19.1	53.6	14.2	16.6	3.6	29.44	30.8
Unsure	15.7	7.2	15.0	4.6	22.9	2.1	32.5	5.08	17.7
Rationale									
Insufficient legal trails	25.7	17.4	19.5	35.8	29.3	19.4	11.9	28.5	24.4
Legal trails unappealing	15.5	10.4	17.0	21.5	12.7	22.2	3.5	20.0	16.1
Convenience	2.1	3.1	3.3	0.6	1.2	0.7	3.8	1.5	2.5
Freedom/Adventure	18.2	17.6	24.9	14.0	19.5	18.1	22.1	15.8	20.4
It is harmless...*	24.8	30.9	24.2	23.1	24.3	27.1	31.8	27.6	20.4
Other	13.64	20.7	11.2	5.0	13.0	12.5	26.9	6.3	16.3

DK = Denmark; FR = France; DE = Germany; IT = Italy; NL = Netherlands; NO = Norway; CH = Switzerland; UK = United Kingdom * "It is harmless if done at quiet times".

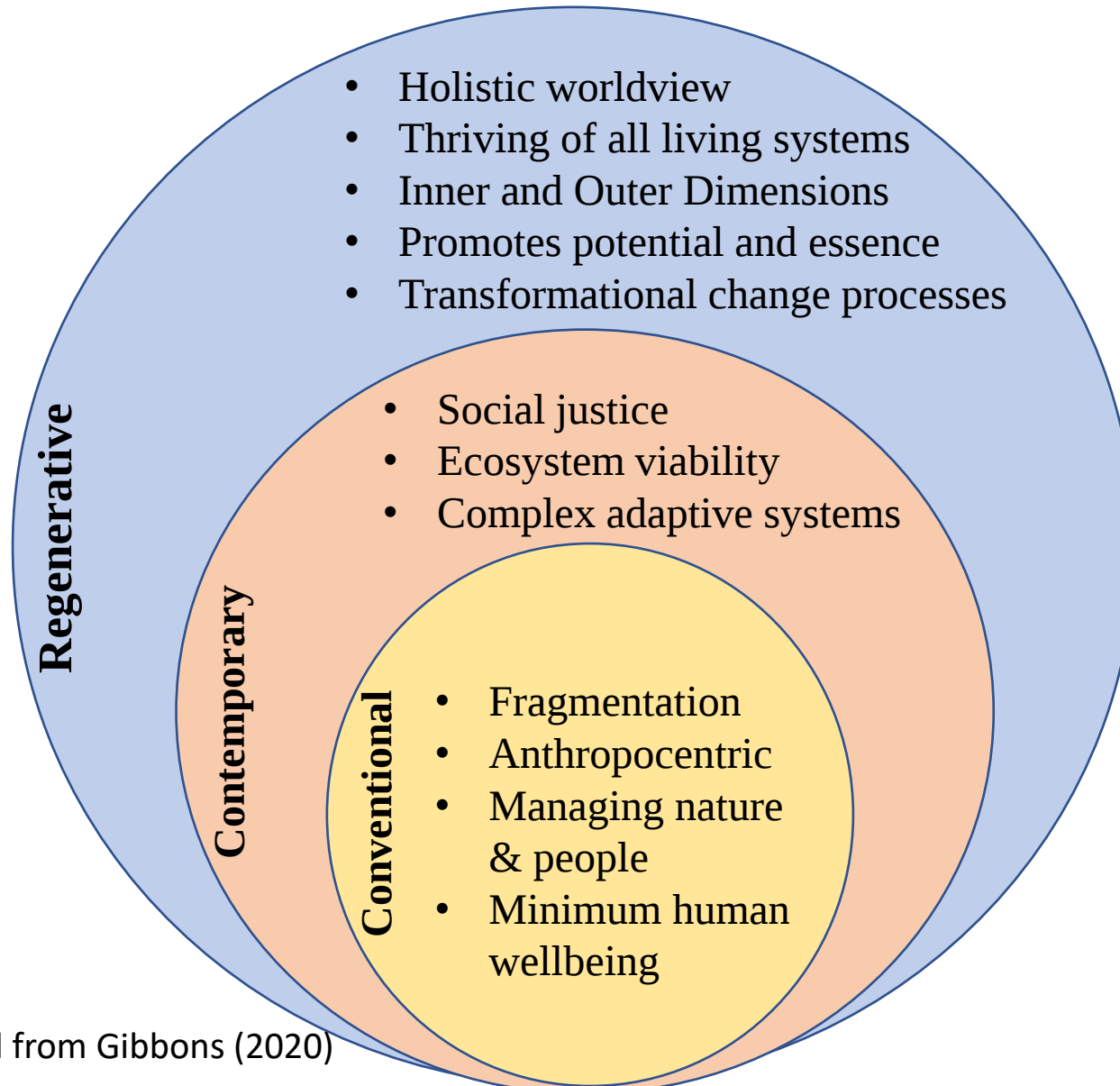
Regenerative – The new sustainable?



Contemporary Sustainability – aims to maintain the status quo through mitigation. Prevent further degeneration.

Regenerative Sustainability – aims to manifest thriving and flourishing living systems.

The Regenerative Paradigm



Rather than seeing problems and solutions in the world, regenerative sustainability see living systems as existing in transitory states along a continuum of health and complexity.

Considers how contexts and environments influence worldviews and behaviours.

(Gibbons, 2020)

Implications

- From a research perspective, the theoretical position that we adopt dictates the specific questions that we seek to answer. Moving away from a position of mitigation or “doing less harm” to one where we ask if and how can we do “more good” is a significant shift.
- Potential to enhance the wellbeing of the entire biosphere through trail building practices. For example, promotion of revegetation and introduction or reintroduction of species to enhance biodiversity, or the creation of wildlife corridors.
- The wellbeing of humans assumes some importance.
- This consideration for the wider biosphere and a systems approach raises interesting questions regarding the approach to individual trails.

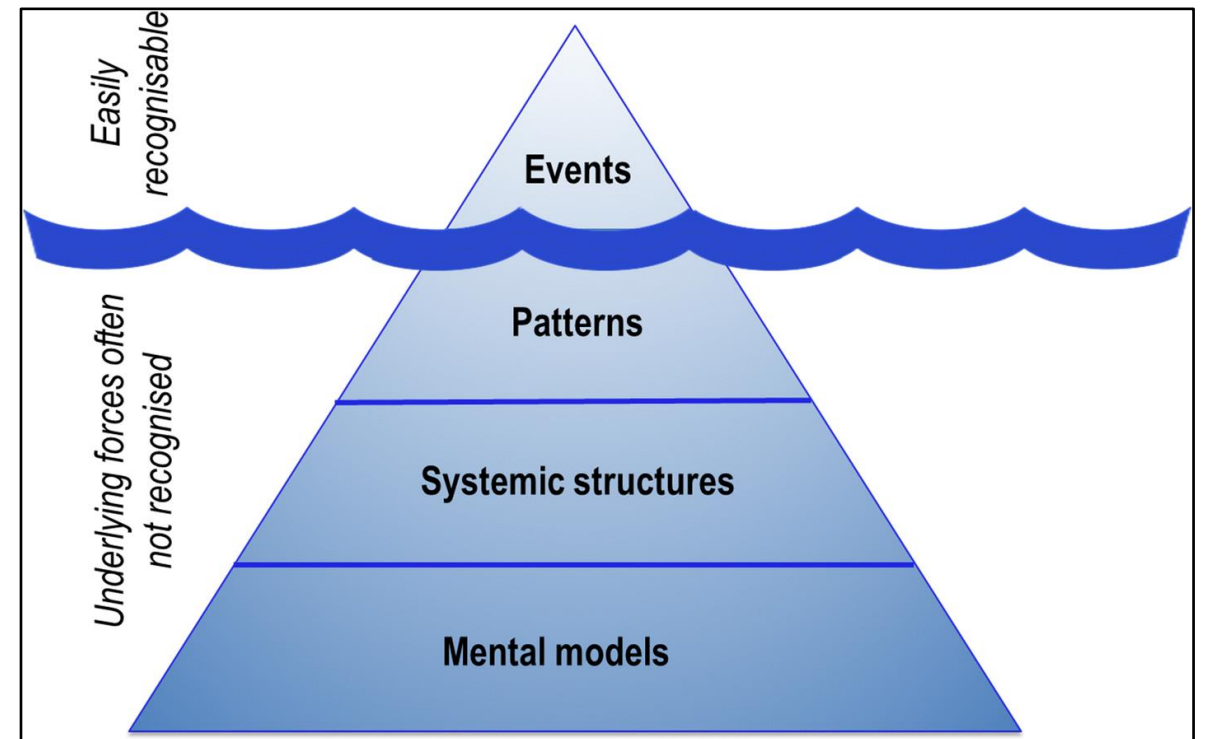


The importance of Inner Worlds

Central to the regenerative paradigm is an inner dimension of sustainability.

Contends that our inner worlds (our thoughts, emotions, identities and beliefs) are fundamental to solving sustainability challenges.

Deep leverage points – difficult to activate but truly transformational.



(Ives et al., 2020)

Realms of Enquiry

What are the rates of erosion or Δ in levels of vegetation cover within a trail corridor?

External

What are the inner factors that influence rider behaviours in respect of the environment?

Internal

	Individual	Collective
External	"It" Empirical enquiry of the outside world. e.g., environmental Science	"They" Systems thinking. Interaction between nature and society.
Internal	"I" Inner worlds of Individual People	"We" Cultures Collectively experienced social values.

How does rider behaviour impact upon rates of erosion or vegetation cover?

How might societal norms impact upon pro-environmentalism?

Attitudes and Behaviours

Connection to nature has been reported as a common motivation for participating in MTB (e.g., Roberts, 2018).

We found evidence of the same but also that participation in MTB resulted in **↑appreciation of nature, ↑willingness to protect trails and positive changes to environmental behaviours.**

However, cross-sectional design and no attempt to explore the development of inner dimensions of sustainability.

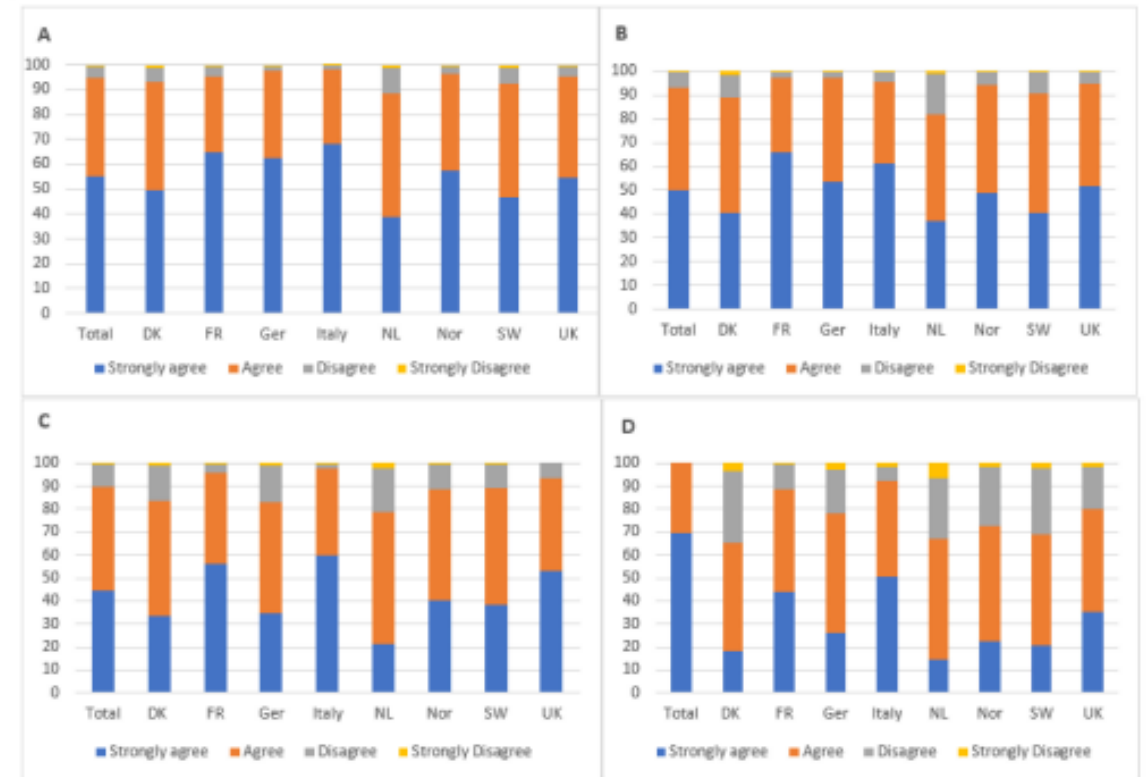


Figure 4. Respondents' perception of the extent to which their use of mountain bike trails has influenced their attitudes towards nature. (A) Increased appreciation of nature. (B) Increased willingness to protect trails. (C) Taken action to protect nature. (D) Changed behaviour to reduce environmental impact.

Pro-environmentalism

- TCOYT - promotes volunteer-based trail maintenance and highlights all trail repair, clean-up and build efforts from trail crews and volunteers across Europe. In 2022 alone, over 6900 volunteer hours were contributed through this initiative (IMBA, 2023).
- Trash Free Trails - community-focused, non-profit organisation which aims to reconnect people with nature through the simple yet meaningful act of removing single-use pollution from wild places. In 2022, TFT removed over 7000Kg of rubbish from 9775km of trails through 2810 volunteer hours.
- Marin Tidy Trails - also seeks to mobilise the mountain bike community in removing litter from trails through trail tidy days and campaigning.



Trail Associations: Holistic Practice?

The practical benefits of TAs are manifold, but they also have an important role to play in promoting inner dimensions of sustainability and in promoting social and equity benefits.

Voluntary participation in recreation and conservation projects can enhance awareness of environmental issues (Asah and Blahna 2012; Molsher and Townsend, 2015) and lead to attitudinal shifts (indicative of increased inner sustainability) and improved stewardship (Dresner and Fischer 2013; Schild, 2018).

However, alongside environmental reasons, the social and fun aspects of volunteer trail building activity have been shown to be important motivations for participation which might contribute to the development of inner dimensions of sustainability (Kamei, et al., 2016).



Figure 5. Attitudes towards trail maintenance and sustainability.

Social sustainability

- MTB encompasses a broad range of riding styles and disciplines.
- Motivations for participation are similarly diverse.
- This may have implications for the development and maintenance of identity.
- In turn this affects social identity and our sense of social norms and sense of community.
- Some riders desire extreme, natural trails.
- ‘unauthorised’ trails can, under certain circumstances, make an important contribution to local economies, provide physical and mental health benefits, offer sporting challenges, and provide a connection with nature (National Access Forum Scotland, 2018).

Table 3. Participation in mountain bike disciplines and the motivation for riding (n = 2050).

		Total	DK	FR	DE	IT	NL	NO	CH	UK
Discipline	XC	15.1	25.1	14.8	11.3	13.8	35.7	11.9	7.9	11.4
	Trail	31.2	35.2	31.0	33.0	26.0	28.9	33.1	26.3	31.8
	Enduro	25.7	16.2	33.2	29.4	33.5	15.7	25.0	31.2	25.7
	Freeride/ DH	12.9	8.3	8.4	14.5	15.2	6.4	14.8	17.8	13.0
	Dirt jump	2.8	2.9	0.8	1.70	2.3	1.7	2.5	2.5	4.4
	Pump track	8.2	8.3	6.4	6.79	6.8	6.8	8.9	11.5	8.1
	Miscellaneous	4.1	3.1	4.9	2.83	1.7	3.4	3.6	1.8	3.8
	Connected to nature	19.2	18.8	22.6	22.9	23.7	19.6	17.9	22.6	15.2
	Escape/solitude	16.7	16.2	17.2	20.5	11.4	17.8	15.8	18.6	17.8
	Challenge	17.3	16.3	13.9	20.2	13.7	17.3	17.7	19.5	17.8
	Risk	3.5	2.5	3.3	2.1	4.3	1.3	3.3	2.7	5.5
	Play	17.4	18.1	16.9	12.8	18.9	16.9	19.8	15.5	17.5
	Exercise/Health	20.2	22.6	19.8	17.1	20.7	22.0	21.6	16.4	19.9
	Accomplishment	1.3	1.2	0.8	1.2	1.1	0.4	1.1	1.1	1.6
	Culture	2.2	1.6	4.0	1.5	3.8	2.4	1.3	1.1	2.3
Other	2.2	2.7	1.5	1.7	2.5	2.2	1.3	2.5	2.5	

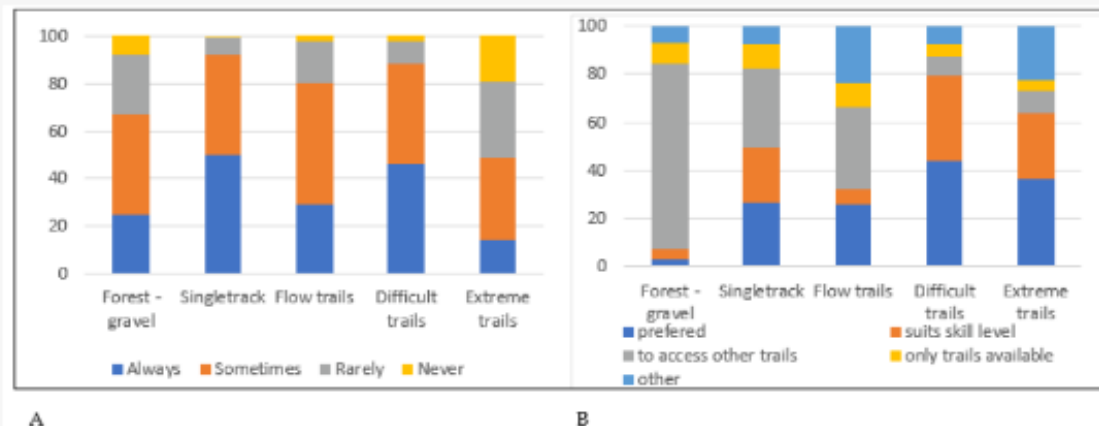
DK: Denmark; FR: France; DE: Germany; IT: Italy; NL: Netherlands; NO: Norway; CH: Switzerland; UK: United Kingdom.

Unauthorised trail use?

Most European riders admit to using illegal or unauthorised trails (Zajc, 2016; Campbell et al., 2021) and, perhaps unsurprisingly, use of unauthorised trails is greatest in countries where riders report a shortage of appropriate legal trails.

But little is understood about the motives for building and using such trails although anecdotal evidence suggests that unsanctioned trails are often initiated by underrepresented groups who are unsatisfied with sanctioned trails, often citing predictable man-made features and perceived sanitation as undesirable elements of official trails (AMB Magazine, 2021).

Figure 1. Self-reported use of different trail typologies: (A) frequency of trail use; (B) reason for trail use.



Implications

- Raises questions about local versus global sustainability.
- How might we choose to prioritise the immediate sustainability of any given trail versus wider planetary benefits?
- What about wider trail networks? Do all trails need to be built to the same standard?
- What about short-lived trails and less sensitive areas?
- Can we sacrifice trails to promote overall sustainability?
- How can we promote equity through provision and location of different types of trail?



The trail to regenerative sustainability

- Requires complementary holistic and reductionist research to improve the evidence, not just of the impact of MTB upon the environment but of strategies for mitigation and also regeneration.
- Explicitly acknowledge the role of the human and of inner dimensions of sustainability with consideration for wider pro-environmental benefits.
- Develop dynamic frameworks which consider the balance of environmental, economic and equality sustainability based upon best available evidence.
- Integrate sustainability within educational provision for trail planners, designers, builders etc.
- Adopt a systems approach which considers the overall health of the wider trail system, local economy and opportunities for equity.
- Promote opportunities for equity, embrace all riding levels, cultures and styles.

Final thoughts

This book represents the first critical examination of the social, cultural, and political significance of mountain biking in contemporary societies.

Part I: Mountain Biking Identities

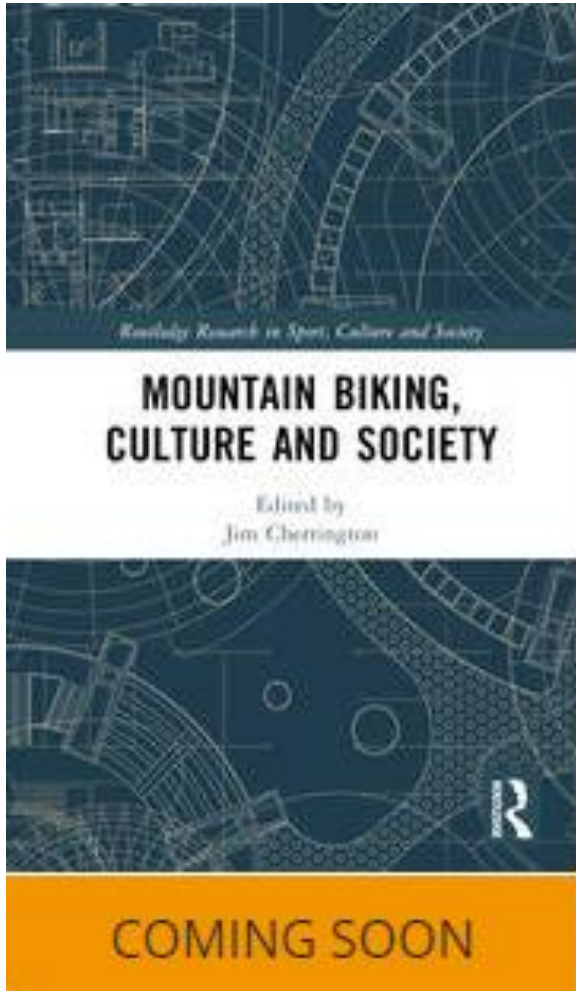
Part II: Mountain Biking Bodies

Part III: Mountain Biking Environments (Sustainable Mountain Bike Trails: Towards a Holistic Approach)

Part IV: The Cultural Politics of Mountain Biking

'Mountain Biking, Culture and Society is the definitive text for anyone interested in understanding mountain biking as a sport, practice, community, identity, and embodied experience. It brings together the most cutting-edge research from scholars around the world, each advancing new ways of thinking about sport, moving bodies, technologies, and the environment. This is highly recommended reading for critical and social scholars of sport, physical culture, action sports and outdoor recreation, as well as those passionate about mountain biking.'

Professor Holly Thorpe, *University of Waikato, New Zealand*



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