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SYSTEMIC INTEGRATION OF NATURE-BASED SOLUTION IN CITIES WITH A FOCUS ON EQUITY AND SOCIAL JUSTICE

A MULTI-DISCIPLINARY LITERATURE REVIEW

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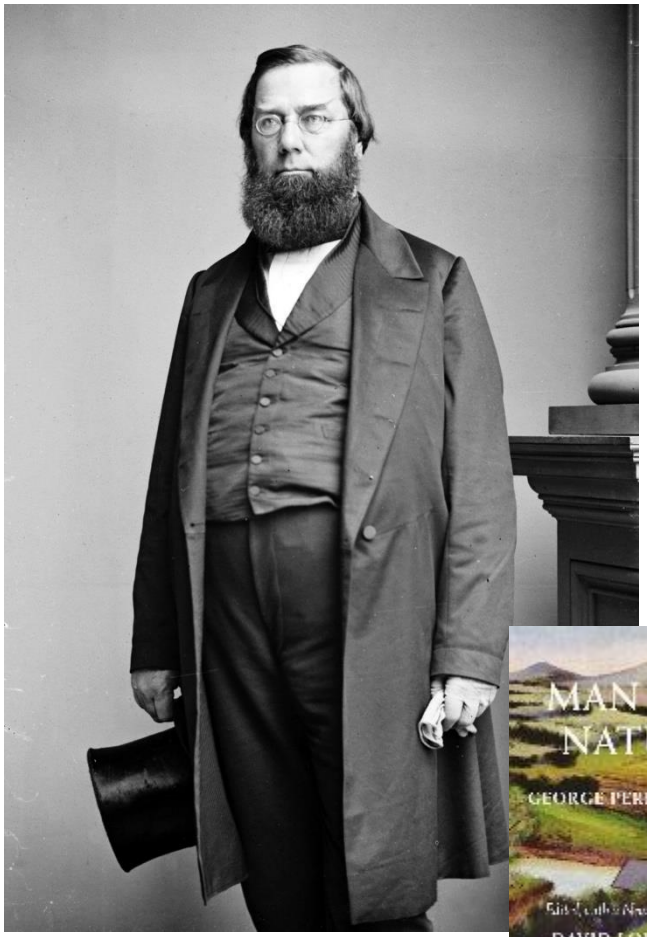
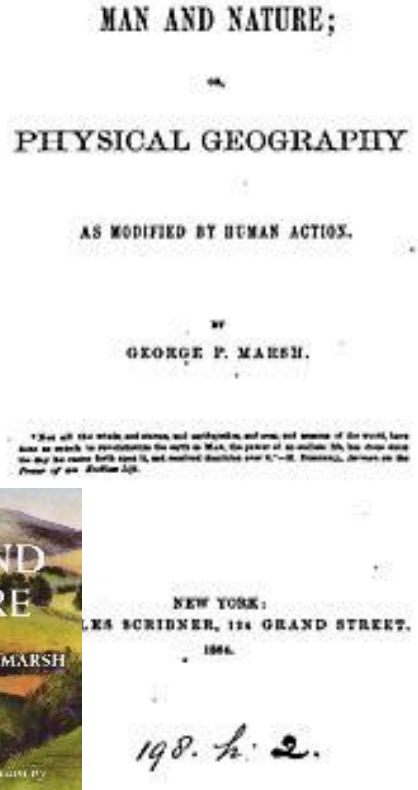
MAN AND NATURE: OR, PHYSICAL GEOGRAPHY AS MODIFIED BY HUMAN ACTION, 1864

GEORGE MARSH




MAN AND NATURE;

OR,

PHYSICAL GEOGRAPHY

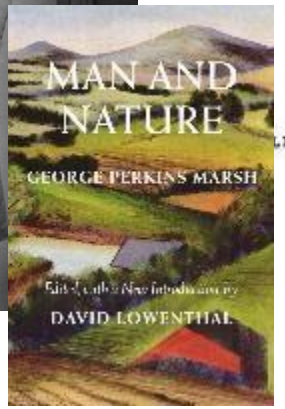
AS MODIFIED BY HUMAN ACTION.

BY

GEORGE P. MARSH.

NEW YORK:
[illegible] SCRIBNER, 124 GRAND STREET.
1864.

198. h. 2.



Man and Nature, in which environmentalism is rooted.

Marsh considers human actions as transformative phenomena

&

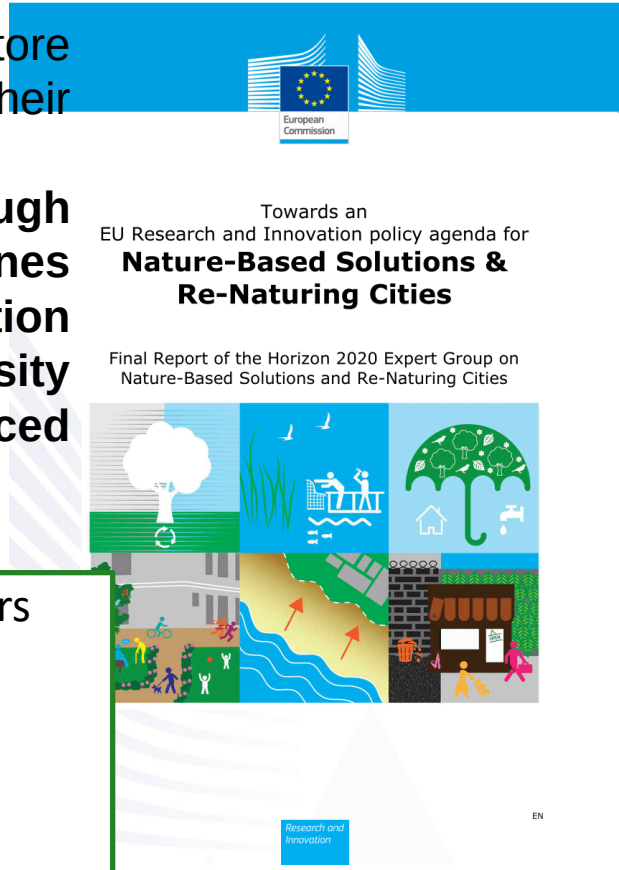
Marsh states that human impact on the environment is the reason for the collapse of ancient Mediterranean civilizations.

DEFINITION OF NBS

"…actions which are inspired by, supported by or copied from nature…" p.5

Aims:

- "Enhancing sustainable urbanization to restore functionality of degraded ecosystems and their services
- **Improving risk management and resilience through utilising nature-based design which combines multiple functions and benefits such as pollution reduction, carbon storage, biodiversity conversation, reducing heat stress and enhanced water retention"**



NBS term is promoted by practitioners and policy makers rather than scientists unlike Ecosystem Services.

- Easy to grasp by non-tech. audiences
- Receive wider support, result in systemic solutions rather than sectorial
- Difficulties integrating scientific ecological knowledge and turning towards new practices.

Eggermont et al. 2015

RESEARCH QUESTIONS

How can NBS, as a policy and planning measure, help to integrate multiple dimensions (social, economic and environmental) and mitigate climate change impacts?

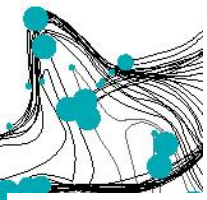
To what extent have current studies/policies considered issues of equity and social justice ?

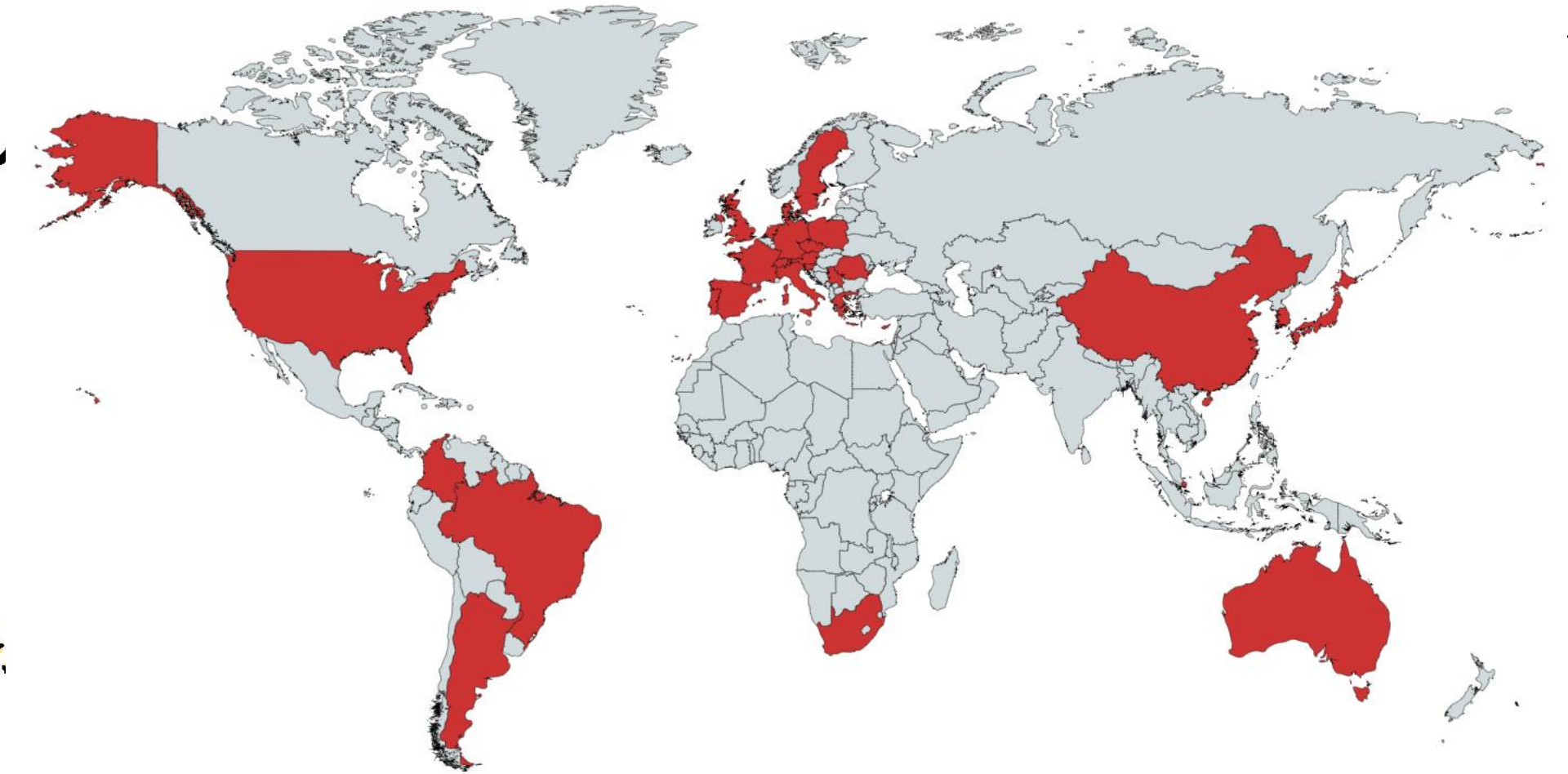
SYSTEMATIC LITERATURE REVIEW

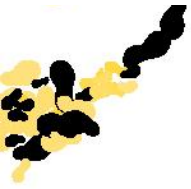
Keywords for the search					Number of articles	
					Scopus	Web of science
"Nature Based" OR "Nature-based" AND "Solutions"	AND	"climate change"	AND	"urban" OR "city*" OR "cities"	49	46
		"*equit*" OR "inequality" "*justice" OR "justness" OR "*fair*" OR "just city" OR "honest"			9	13
		"*inclus*"OR "integr*"			57	20
		"gentrification*"			1	0
		"disaster risk*"			11	5
		"*health*"			48	30
		"wealth*"			2	0
		"societal challenge*"			3	3
		"resilien*"			51	31
Total number of articles after removing multiple ones:						148

SYSTEMATIC LITERATURE REVIEW

Articles found in Scopus and Web of Science after the removal of double counting:	**148**
Initial screening (title – key words – topic)	148
Excluded by abstract:	25
Included after screening abstracts:	123
Included after screening full-text papers:	108



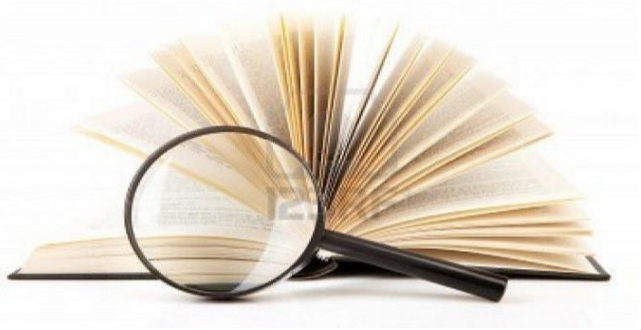




The existing literature studies cover

- Agriculture (Garcia-Llorente et al. 2018)
- Urban Forest in the Mediterranean (Krajter Ostaic et al. 2018)
- Green infrastructure and ecosystem services (Perrotti and Stremke 2018)
- Health benefits of NBS on children and elderly (Kabisch et al. 2017)
- Edible green infrastructure (Russo et al. 2017).

Can existing greening interventions be considered as NBS although they have not been implemented as a response or solution to particular societal challenge?



SYSTEMATIC LITERATURE REVIEW

CODE BOOKS

SYSTEMATIC LITERATURE REVIEW CODE BOOK

The code of article:

General Information: (author, title, year)

Comments (if any):

CRITERIA	DESCRIPTION
Type of study	
Geographical location / case studies (if relevant)	
Problem definition	
Hypothesis	
Research question	
Aim	
Research Methods	
Scale	
Data collection Plan	
Data Analysis	
Involved actors (by whom)	
which social groups are targeted/researched	
how where they identified	
Definition of NBS	
Climate Change Framing	
Main Results	
Methodological Lessons Learnt (strengths – limitations)	
Suggestions for future research (if any)	

The code of article: 1

General Information: Albert, C., Schröter, B., Haase, D., Brillinger, M., Henze, J., Herrmann, S., . . . Matzdorf, B. (2019). Addressing societal challenges through nature-based solutions: How can landscape planning and governance research contribute? Landscape and Urban Planning, 182, 12-21

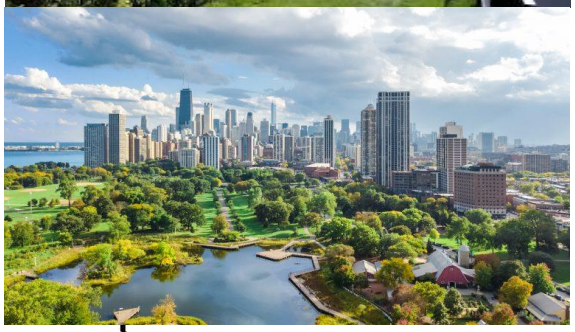
CRITERIA	DESCRIPTION
Geographical location / case studies (if relevant)	Lahn River / Hesse / Germany
Problem definition	-
Hypothesis	Nature-based solutions (NBS) in river landscapes, such as restoring floodplains, can not only decrease flood risks for downstream communities but also provide co-benefits in terms of habitat creation for numerous species and enhanced delivery of diverse ecosystem services.
Research question	-
Aim	This paper aims to explore how landscape planning and governance research can contribute to the identification, design and implementation of NBS, using the example of water-related challenges in the landscape of the Lahn river in Germany.
Objectives	(i) to introduce the NBS concept and to provide a concise definition for application in planning research, (ii) to explore how landscape planning and governance research might support a targeted use and implementation of NBS, (iii) to propose an agenda for further research and practical experimentation
Research Methods	1) the proposed scientific definition of NBS was developed based on suggestions for operationalization 2) in order to explore potential contributions from landscape planning and governance research to NBS implementation, a conceptual framework was developed (according to the method proposed by Tomich et al., 2010) and used as the basis for elaboration. 3) the complementary contributions of landscape planning for designing NBS, and governance instruments for implementation were identified in a meta-synthesis (Newig & Fritsch, 2009) of relevant publications.
Scale	River Landscape
Involved actors (by whom)	-
which social groups are targeted/researched	No clear definition – it is written "related actors"
how and where they identified	-
Definition of NBS	NBS is defined in several ways. Some examples: *"We define NBS as actions that alleviate a well-defined societal challenge (challenge-*

SYSTEMATIC LITERATURE REVIEW

Year	Number	
2019	23	
2018	41	
2017	31	
2016	11	
2015	2	Capotorti, G., et al. (2015). "Setting priorities for urban forest planning. A comprehensive response to ecological and social needs for the metropolitan area of rome (Italy)." Sustainability (Switzerland) **7**(4): 3958-3976. Eggermont, H., et al. (2015). "Nature-based solutions: New influence for environmental management and research in Europe." GAIA **24**(4): 243-248.

Q1 HOW CAN NBS, AS A POLICY AND PLANNING MEASURE, HELP TO INTEGRATE MULTIPLE DIMENSIONS (SOCIAL, ECONOMIC AND ENVIRONMENTAL) AND MITIGATE CLIMATE CHANGE IMPACTS?

Q1 HOW CAN NBS, AS A POLICY AND PLANNING MEASURE, HELP TO INTEGRATE MULTIPLE DIMENSIONS (SOCIAL, ECONOMIC AND ENVIRONMENTAL) AND MITIGATE CLIMATE CHANGE IMPACTS?



Ziogou et al. (2018). Implementation of green roof technology in residential buildings and neighborhoods of Cyprus. *Sustainable Cities and Society, 40*, 233-243.

Russo et al. (2017). Edible green infrastructure: An approach and review of provisioning ecosystem services and disservices in urban environments. *Agr., Ecosys. and Envir. 242*, 53-66.

Song et al. (2019). Nature based solutions for contaminated land remediation and brownfield redevelopment in cities: A review. *Science of the Total Environment, 663*, 568-579.

Belle, J. A., Collins, N., & Jordaan, A. (2018). Managing wetlands for disaster risk reduction: A case study of the eastern Free State, South Africa. *Jamba: Journal of Disaster Risk Studies, 10*(1).

Zwierzchowska, I., Fagiewicz, K., Poniży, L., Lupa, P., & Mizgajski, A. (2019). Introducing nature-based solutions into urban policy – facts and gaps. Case study of Poznań. *Land Use Policy, 85*, 161-175

Wild, T. C., Henneberry, J., & Gill, L. (2017). Comprehending the multiple 'values' of green infrastructure - Valuing nature-based solutions for urban water management from multiple perspectives. *Environmental Research, 158*, 179-187.

"…such as green roofs, parks and green spaces can make significant contribution to enhancing the provision of fundamental ecosystem services through NBS."

Zimmermann et al. 2016

- Multifunctionality
- Potential of enhancing social cohesion has not been well noticed yet, although the linkages between green and wellbeing is well understood.
- The potential of enhancing economic development is least noticed.
- Opportunity of profit does not match with the community and market-led mechanisms to deliver these goods and services
- On one hand, the purpose is to deliver long-term regeneration strategies to attract investors by improving image of the area.
- There are not many actions towards supporting citizens in using it
- Supporting large-scale, nature-based solution implementation in cities can be achieved only by bringing them into the local urban agenda.

Zwierzchowska et al. 2019 and Wild et al. 2017

Q2 TO WHAT EXTENT HAVE CURRENT STUDIES/POLICIES CONSIDERED ISSUES OF EQUITY AND SOCIAL JUSTICE ?

"NBS are
- *A human-centered utilitarian concept*
- *Include other knowledge systems beyond modern science"*

"NBS clearly refers to societal challenges (ontological dimension), problems defined by humans (epistemic dimension), and the sustainable use of nature (practical dimension)"

Eggermont et al. 2015, p.246

- *Considering **local actors' perspectives, needs and capacities, including cognitive/ emotional aspects and nonrational behaviour.***
- *Addressing existing power mechanisms and structures to ensure that the needs of the most vulnerable/ marginalised members of society are taken into account.*
- *Combining in order to address individual, communitarian and hierarchical patterns of social behaviour of different actors.*

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

CONCLUSION

- *"Local planning practices that support these approaches are scattered, and measures are **neither systematically implemented nor comprehensively reviewed**."*
- *"Existing measures are limited their **focus regarding the ecological structures** and the ecosystem services they support and the hazard and risk factors they address."*

Warmsler et al. 2016

- *"Limited attention has been given to addressing the principles of spatial planning and how these may be translated into practice through the procedures."* Scott et al. 2016

- *"The shift is happening now toward a more **holistic understanding**... in general and particularly **in human well-being and sustainable development**."* Schubert et al 2019

- *"NBS have not been able to **actively involve citizens** and to address successfully food security, poverty alleviation, and inequality in urban areas*." Saumel et al. 2019

ADDITIONAL REFERENCES

Eggermont, H., Balian, E., Azevedo, J. M. N., Beumer, V., Brodin, T., Claudet, J., . . . Le Roux, X. (2015). Nature-based solutions: New influence for environmental management and research in Europe. *GAIA, 24*(4), 243-248.

Saumel, I., Reddy, S. E., & Wachtel, T. (2019). Edible City Solutions-One Step Further to Foster Social Resilience through Enhanced Socio-Cultural Ecosystem Services in Cities. *Sustainability, 11*(4).

Schubert, P., Ekelund, N. G. A., Beery, T. H., Wamsler, C., Jönsson, K. I., Roth, A., . . . Palo, T. (2018). Implementation of the ecosystem services approach in Swedish municipal planning. *Journal of Environmental Policy and Planning, 20*(3), 298-312.

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Wamsler, C., Niven, L., Beery, T. H., Bramryd, T., Ekelund, N., Jönsson, K. I., . . . Stålhammar, S. (2016). Operationalizing ecosystem-based adaptation: Harnessing ecosystem services to buffer communities against climate change. *Ecology and Society, 21*(1).

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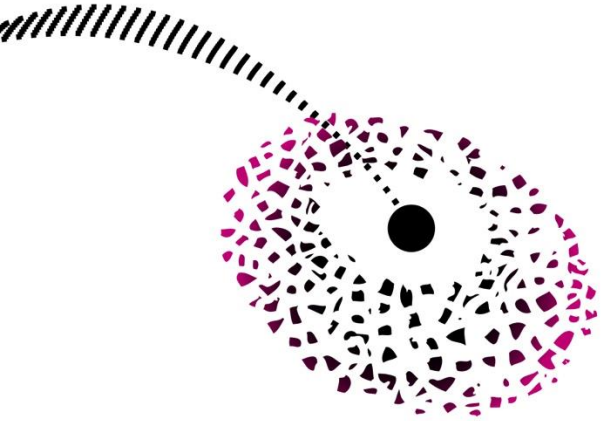

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