

Nature Based Solutions: Reporting and analyzing insights from Europe

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ITS2.14/HS12.2 – Nature-Based Solutions for Global Environmental Challenges and SDG nexus research

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1. Background: The ARTISAN project

Achieving Resiliency by Triggering Implementation of nature-based Solutions for climate Adaptation at a National scale (2020-2028)

Coordinator

- French Office of Biodiversity.



Objectives

- Demonstrating and valorizing the potential of NBS.
- Raising awareness and training stakeholders on NBS.
- Supporting and amplifying NBS projects in Metropolitan and overseas France.



Number of partners and pilot sites

- 28 partners.
- 40 actions and 10 NBS projects in Metropolitan-Overseas France.

Foreseen plans

- A wide scale Demonstrator program.
- Conception, adaptation and dissemination of decision support tools.
- Creation and animation of actor networks.

2. Objectives of the presented work

Action A2: Status report on knowledge building needs in order to mainstream Nature-Based adaptation Solutions (NBaS)

- **Outcome 1:** A multi-scale state of the art on NBaS

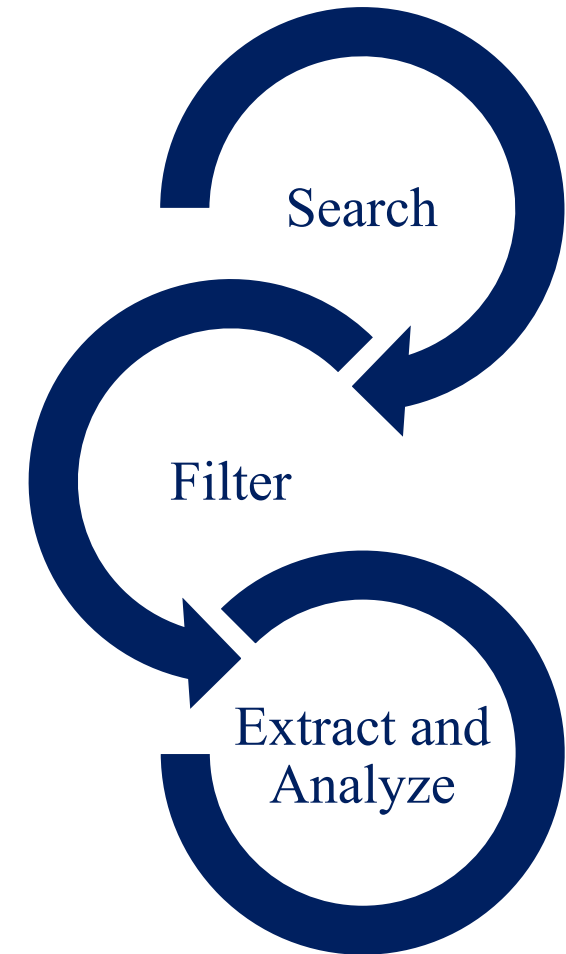
Target scales: France (National), Europe (Regional) and International

Research problematic: Revealing the dynamic, progressive and ongoing to climate change related notions, and ultimately to NBaS.

- **Outcome 2:** An inventory of research needs for NBaS in France

Target scale: France (National)

Research problematic: Prioritizing research needs for mainstreaming NBaS and for accurately mapping actors.



2. Objectives of the presented work

Why a multi-scale approach ?

- Through the analysis of different scales, micro to macro insights are obtained.
- The national analysis provides insights on the past, current and future orientations of NBAS in France → *Scientific literature*
- The national to regional approach reveals France's position with respect to the European continent → *EU H2020 research programme*
- The regional to international approach reveals the position of Europe with respect to the global trends → *International institutional reports*

The analysis of each scale draws up independent findings, which at a combined state allow the establishment of a knowledge inventory.



3. The National scale: Scopus database

Objectives

Determining the history of NBaS in France (scientific literature)

- Examining the status of NBS to NBaS
- Identifying types and purposes
- Mapping NBaS in France
- Determining the concerned actors (labs, funding parties ...)

An inventory of research needs for NBaS in France

- Perspectives
- Revealing scientific gaps
- Noting implementation gaps and challenges

Methodology

Searching the Scopus database for scientific literature (i.e. journal articles) using three different queries to study the transition to NBaS

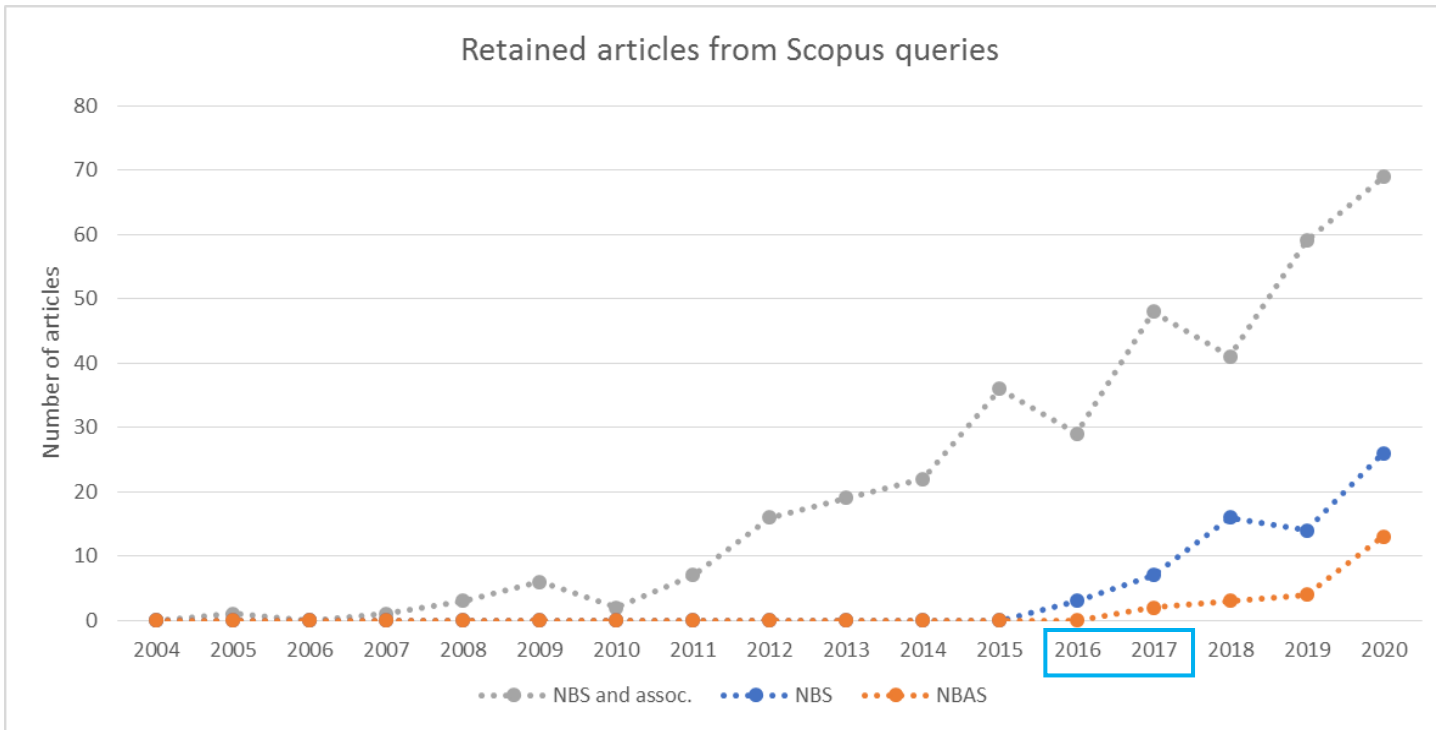
1- “nature based solutions” OR “Ecosystem-Based Adaptation” OR “Urban green infrastructure” OR “green solutions” OR “ecosystem services” OR “green blue solutions” OR “ecological restoration” OR “urban forests” OR “renaturing” OR “ecological engineering” OR “ecosystem-based mitigation” OR “natural infrastructure” OR “natural capital” OR “ecosystem services” AND “stakeholders” OR “actors” OR “citizens” OR “communities” OR “municipalities” AND “France” AND “climate change” AND “Adaptation”

2- “nature-based solutions” AND “France”

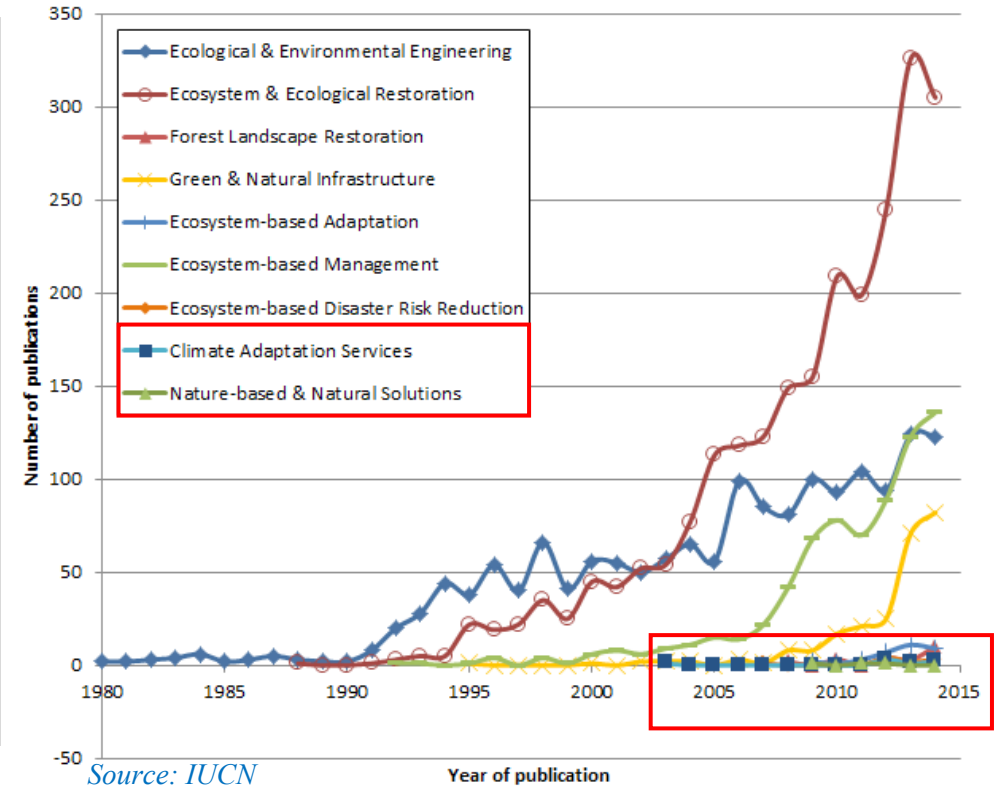
3- “nature-based solutions” AND “climate change” AND “adaptation” AND “France”

Query	Records found	Records retained
1	1132	368
2	108	66
3	36	22
Total	1276	456

3. The National scale: Publication trends



Source: A2 analysis



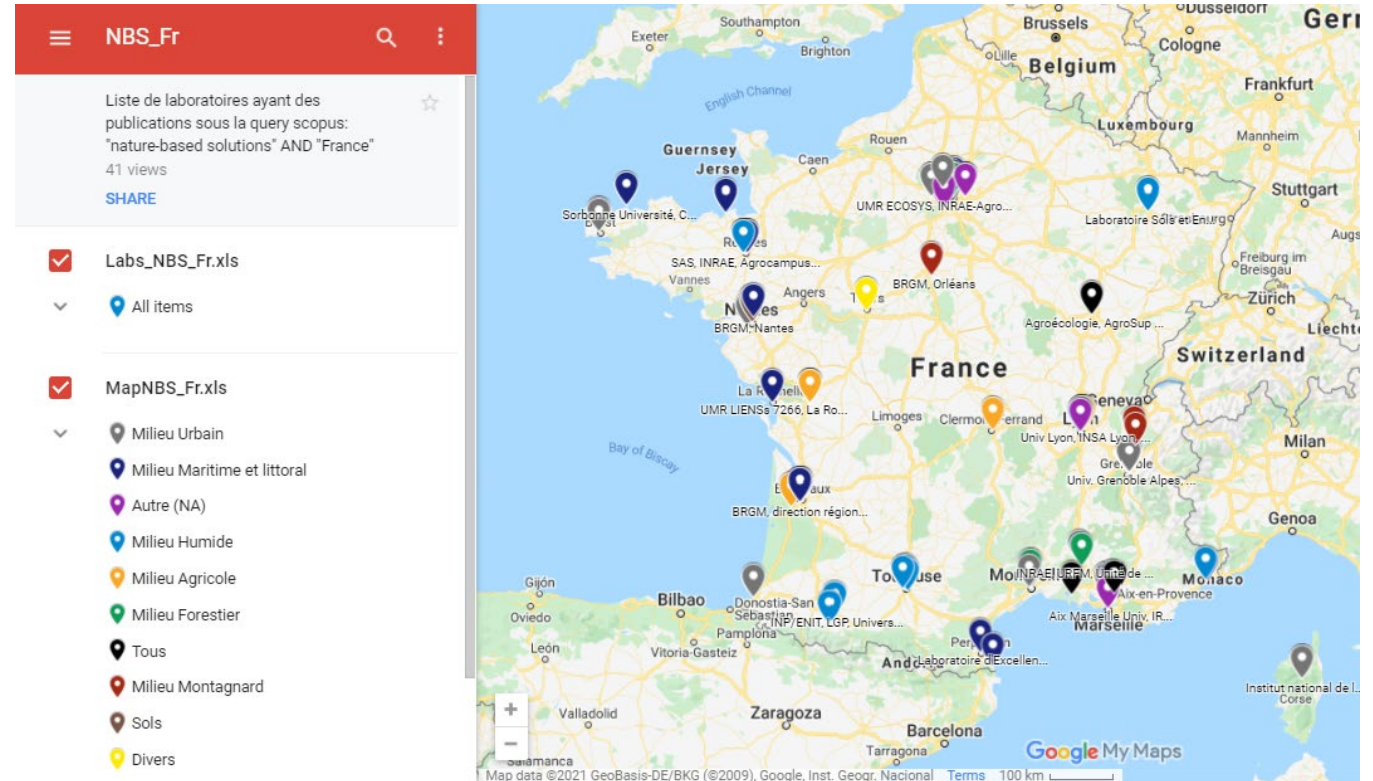
Source: IUCN

- Trends of scientific literature on NBS and associated concepts in France are somewhat similar to the international trends determined by the IUCN.
- Publications on NBS (in strict terms) started appearing in 2016 in France, while those on NBaS started to appear in 2017.
- Both French NBS and NBaS curves indicate an increasing trend, however, publications on NBaS are still relatively scarce.

3. The National scale: Actors - laboratories

NBS labs and mediums

Medium	Count
Urban	32
Sea and coastal	22
Other	19
Humid	18
Agriculture	16
Forest	12
All	12
Mountainous	5
Soil and land	2
Diverse	1



“nature-based solutions” AND “France”

Number of labs: 126, dominant medium: Urban

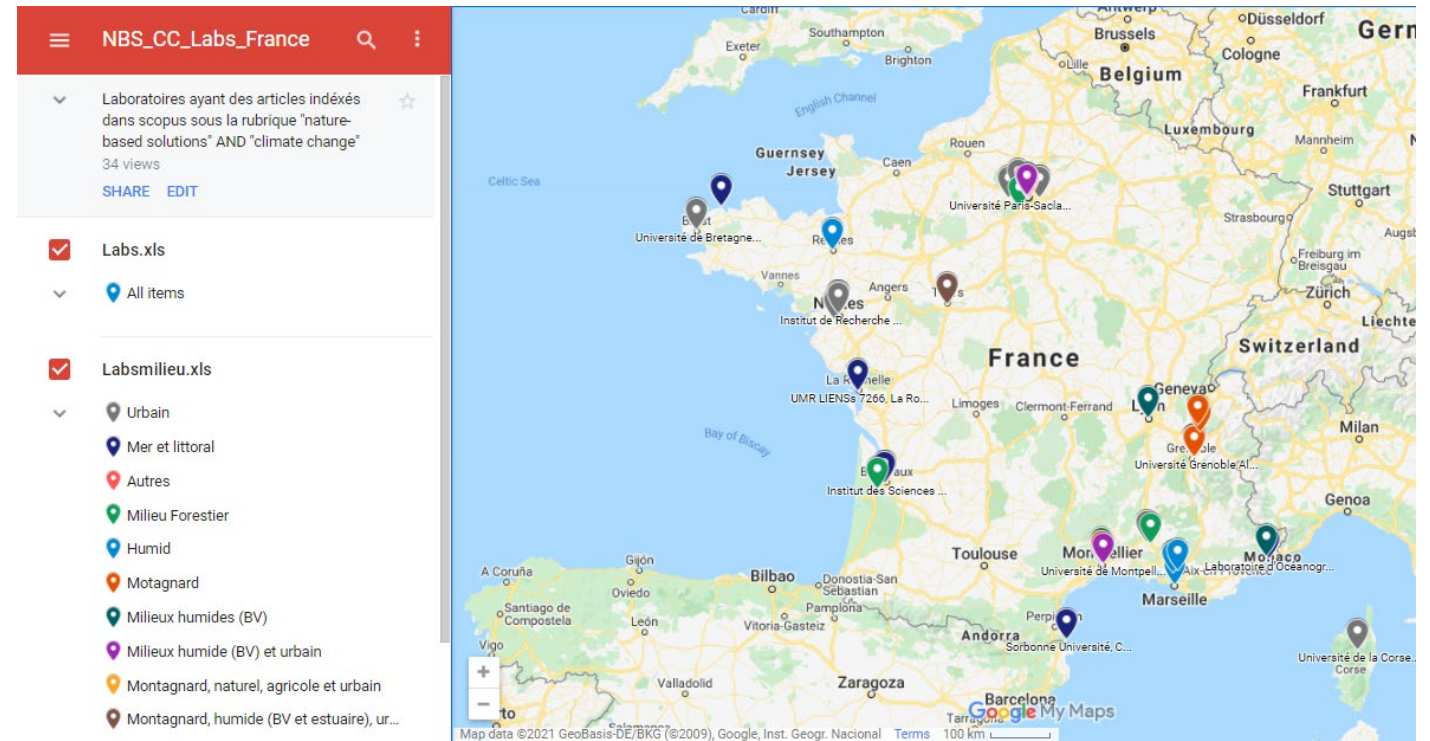
https://www.google.com/maps/d/viewer?mid=1B43M66m6pBtJY15Cv-izzpXSK_Eqc8NG&ll=46.26623984248091%2C5.2999740791577175&z=6

- A rich distribution of NBS related labs can be seen in France. Accordingly, a high level of scientific awareness on NBS in the country can be deduced.
- Spatially, several clusters of NBS labs can be seen, namely in the Parisian region, the Grenoble-Alps region and the French South.
- Almost the entire French coast, both on the Mediterranean Sea and Atlantic Ocean, sides has actively NBS working labs.

3. The National scale: Actors - laboratories

NBaS labs and mediums

Medium	Count
Urban	16
Sea and coastal	8
Other	7
Forest	7
Humid	4
Mountainous	4
Humid (watersheds)	3
Humid (watersheds) and urban	3
Mountainous, natural, agricultural, and humid	2
Mountainous, humid (watershed), urban, humid (estuary), natural (valley)	1



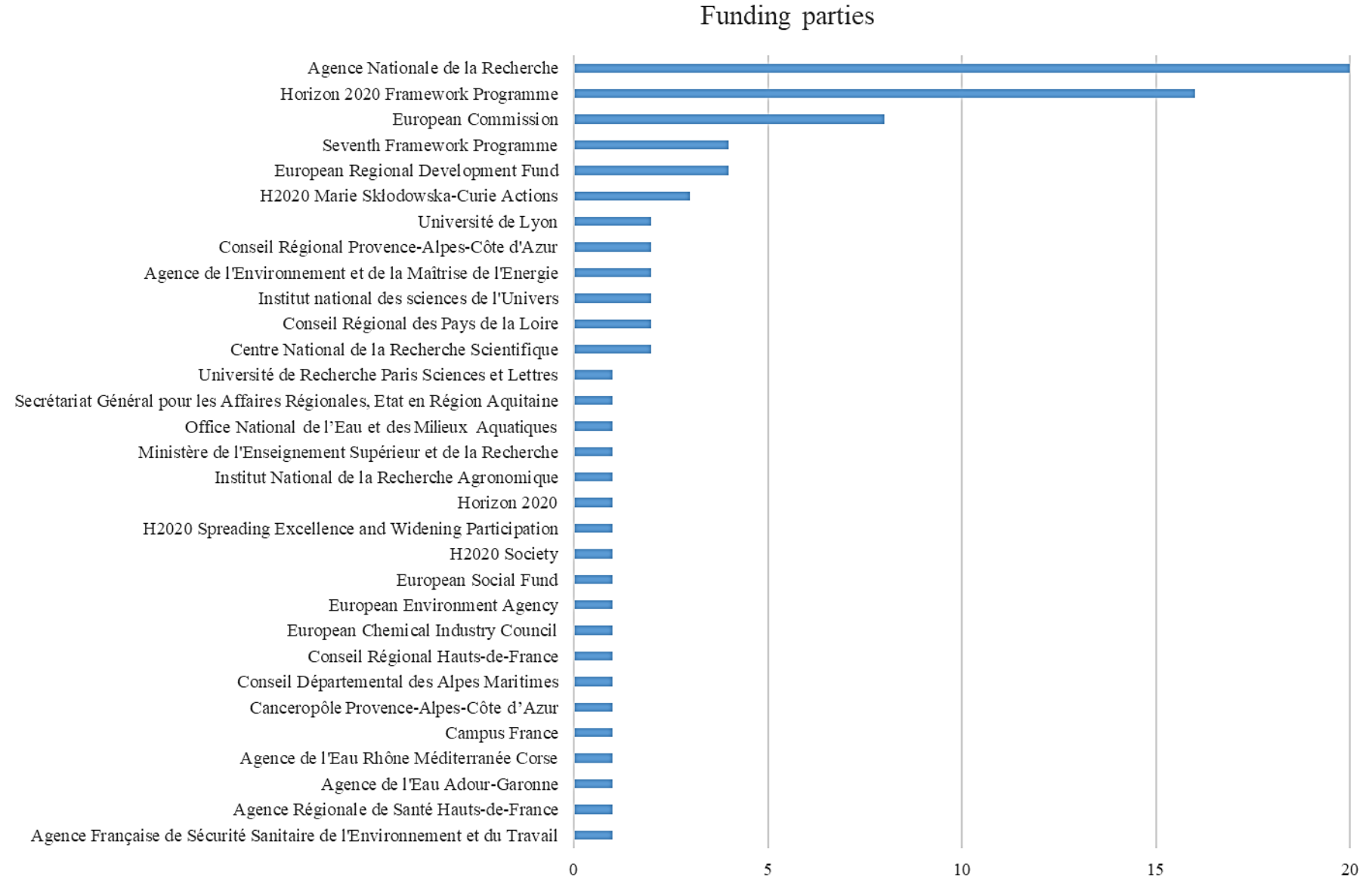
“nature-based solutions” AND “climate change” AND “adaptation” AND “France”

Number of labs: 46 , dominant medium: Urban

<https://www.google.com/maps/d/u/0/edit?mid=1O2un6-5uOGnUEjQKPja1P7GhSSDiVlmw&usp=sharing>

- Graphically, the number of labs working on NBaS is much less than those shown in the previous map.
- Spatially, the distribution of the NBaS related labs shows two aggregations: the first is in the Parisian region while the second lies in the South-Eastern section of the country in the Grenoble-Alpine region.
- The Northern, North-Eastern and Central parts of France are relatively short on NBaS related labs.

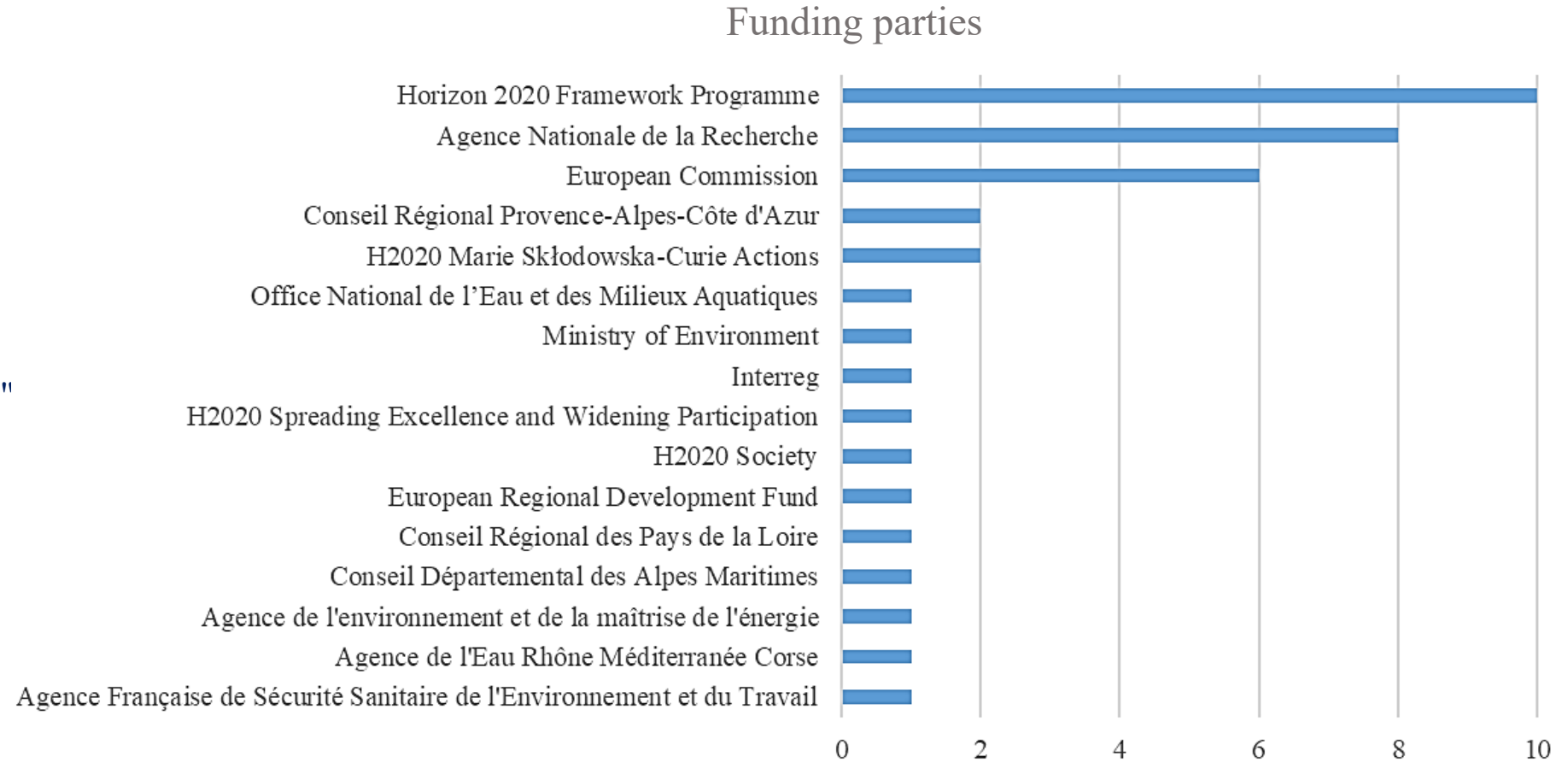
3. The National scale: Actors – Funding parties



"nature-based solutions" AND
"France"

3. The National scale: Actors – Funding parties

"nature-based solutions" AND
"climate change" AND "adaptation"
AND "France"



4. The Regional scale: H2020 projects

Objectives

- Lessons learned from completed projects
- Ongoing efforts
- Target areas (statistics by European countries)
- Potential Success stories and opportunities
- Limitations, challenges

Methodology

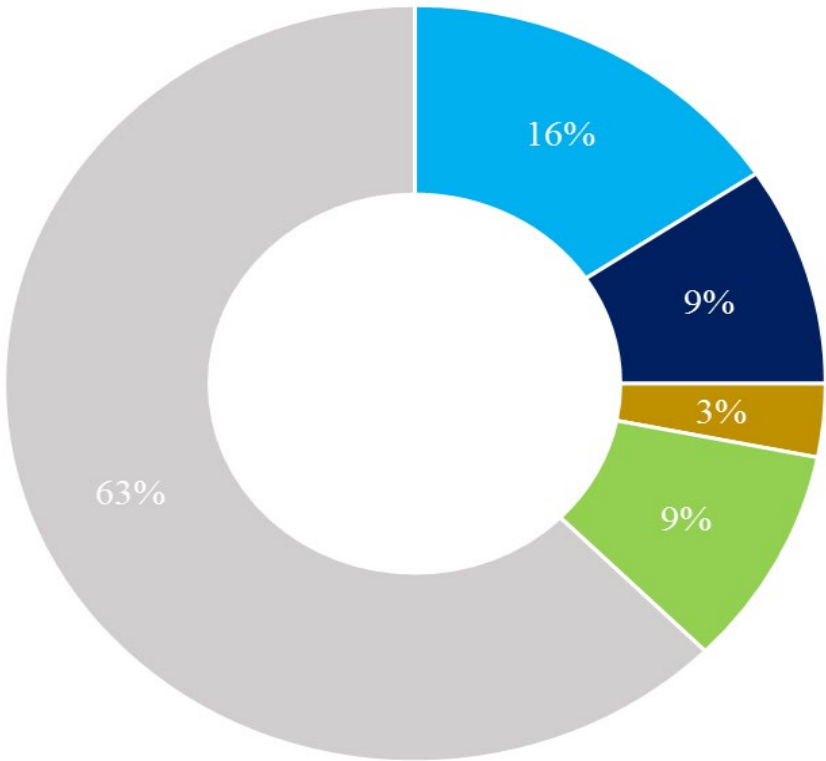
Searching the CORDIS database for NBaS related H2020 projects

H2020 database search	Project acronym	Full name of the project Validation of projects against supporting evidence (Wild et al. 2020) and Oppla database
Status Beginning-Ending <i>Ongoing/Ended</i>	Project results from CORDIS database and each project's website	Sorting of outcomes per type
Filtering deliverables per problematic, thematic, target area and NBS studied	Extracting information of interest	41 projects (16/41) ~ 616 outcome ~ <u>239 deliverables</u>

A two level classification:

- General → by medium
- Detailed → by pilot site, problematic and NBaS (projected or implemented)

DRYvER
PONDERFUL
MaCoBioS
CONEXUS
INTERLACE
Green CURIOCITY
CLEARING HOUSE
OPERANDUM
proGInreg
EuPOLIS
FutureMARES
VARCITIES
GrowGreen
RECONNECT
UNaLab
Nature4Cities
PHUSICOS
CLEVER Cities
REGREEN
NATURVATION
ReNATURE
NAIAD
EdiCitNet
URBAN GreenUP
URBiNAT



- Milieu Humide
- Milieu Maritime et littoral
- Milieu Montagnard
- Milieu Naturel
- Milieu Urbain

4. The Regional scale: H2020 projects

Detailed classification

Table 8: The OPERANDUM project

Project	Study area	Specificities /Specific problematic	Open Air Lab's general problematic	Project's General Problematic	Milieu (ref A1)	NBAS	P/R
OPERANDUM	Three pilot areas in the Po valley Italy OAL Po valley Panaro river	Flooding	The delta of Po river represents a transition between the river and the sea, and has therefore different hydraulic, morphological and biological characteristics Flooding, droughts, coastal erosion, potential storm surge Economic engine for Italy (agriculture fisheries, food, manufacturing) Biodiversity is at risk (UNESCO protected areas)	Severe hydro-meteorological phenomena are having a high impact in European territories and are of global concern. The science behind these phenomena is complex and advancement in knowledge proceeds with progress in data acquisition and forecasting useful for real-scenario interventions. The employment of nature-based solutions (NBS) to mitigate the impact of hydro-meteorological phenomena is not adequately demonstrated, still uncoordinated at the European level, therefore not reaching full potential. Reduce hydro-meteorological risks in European territories through co-designed, co-developed, deployed, tested and demonstrated innovative green and blue/grey/hybrid NBS	Humid area (riverbank)	Installation of herbaceous perennial deep rooting plants as coverage of earth embankments, for preventing riverbank failures induced by erosion.	P
	Italy Bellocchio beach (UNESCO World Heritage site)	Coastal erosion			Merjet littoral (Sea and coastal areas)	Artificial dune consolidated with naturalistic engineering work that should protect a the dune and study area from erosion	P
	Italy Po di Goro	Flooding, drought and salt intrusion			Humid area (river delta)	NBS that mitigate salt intrusion and save the many activities related to agriculture along the Po river	P
	Finland Lake Puruvesi catchment	Forest harvesting and extreme weather events may increase suspended solid and nutrient load to Lake Puruvesi Subsequent Eutrophication	Known for its pure water and has uniquely excellent underwater visibility that reaches up to 12 meters. However, recent observations have		Humid area (Lake)	Peak flow control structures Sedimentation ponds Submerged dams	P

H2020 projects

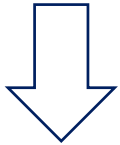
Table 1: The DRYvER project
Table 2: The PONDERFUL project
Table 3: The MaCoBioS project
Table 4: The CONEXUS project
Table 5: The INTERLACE project
Table 6: The Green CURIORITY project
Table 7: The CLEARING HOUSE project
Table 8: The OPERANDUM project
Table 9: The proGReg project
Table 10: The EuPOLIS project
Table 11: The FutureMARES project
Table 12: The VARCITIES project
Table 13: The GrowGreen project
Table 14: The RECONNECT project
Table 15: The UNaLab project
Table 16: The Nature4Cities project
Table 17: The PHUSICOS project
Table 18: The CLEVER Cities project
Table 19: The REGREEN project
Table 20: The NATURVATION project
Table 21: The NBS2017 project
Table 22: The ReNATURE project
Table 23: The CONNECTING Nature project
Table 24: The NAIAD project
Table 25: The EdiCitNet project
Table 26: The URBAN GreenUP project
Table 27: The ThinkNature project
Table 28: The URBiNAT project

- A detailed classification of the retained projects was performed to filter them according their study areas, general and specific environmental challenges, medium of interest, type of NBaS and status (prospected or realized)
- The aim of this classification is to filter deliverables for curating information of interest.

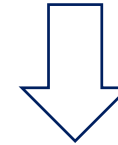
5. International scale: UN bodies projects

Objectives

When did the international scope shift to NBaS

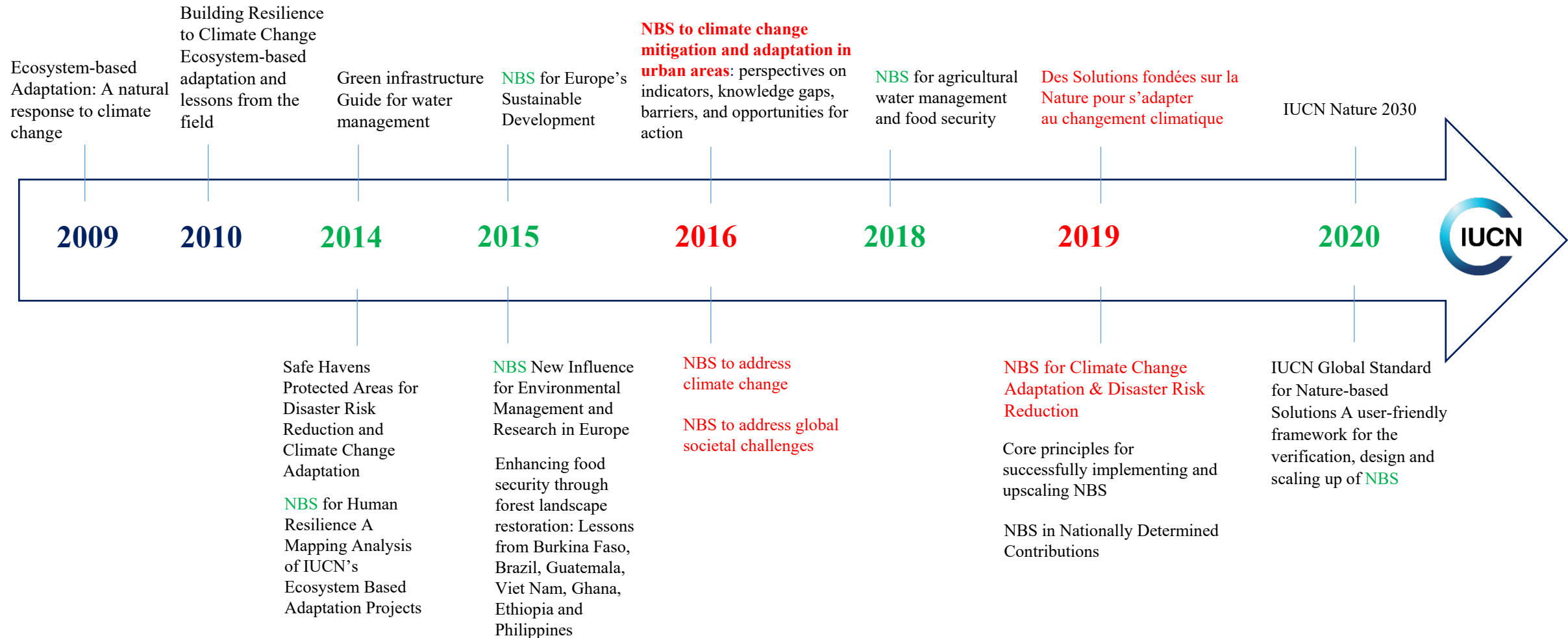


- The UN Environment Programme (UNEP) was placed to lead the UN, by supporting a coordinated global effort on NBS
- Building on the outcomes of the NBS manifesto developed during the Climate Action Summit to unlock the full potential of nature
- Paving the way for the success of the United Nations Decade of Ecosystem Restoration 2021-2030.



- NBS were actively promoted in the IUCN's 2009 position paper for the UNFCCC COP 15
- Early efforts were directed towards creating and implementing mitigation measures.
- As of 2010, with increasing knowledge of the inevitable short and medium term effects, adaptation is now seen in the UNFCCC as an equally important strategy, next to mitigation.

5. International scale: IUCN



- A chronological shift from EbA → NBS → NBaS.
- NBaS appeared in 2016. This reflects a relative recent acknowledgment of these solutions.

5. International scale: IUCN

Brief summary of key findings

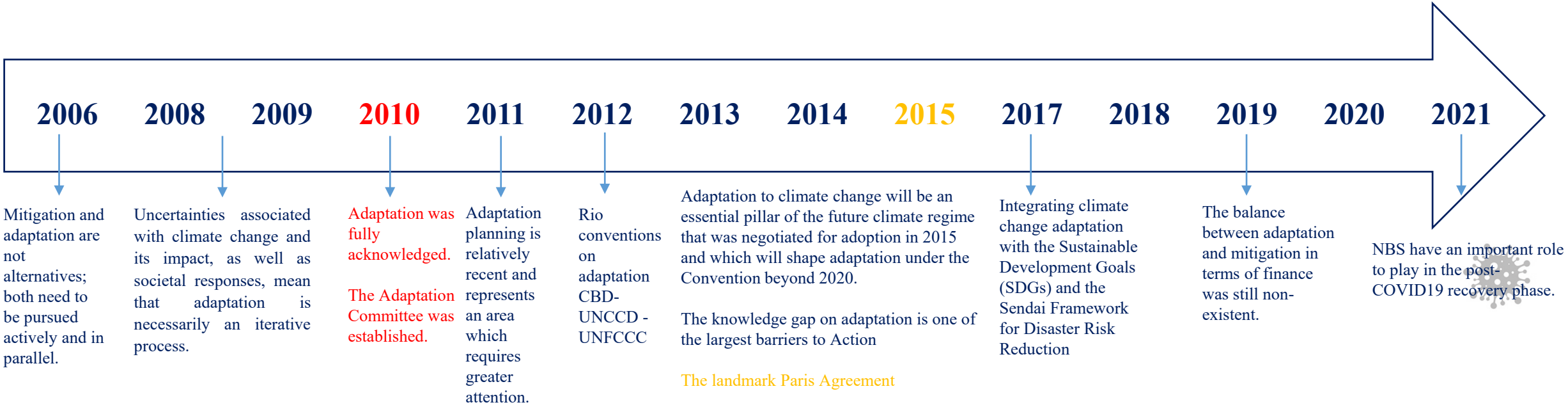
- NBS can address both the causes and consequences of climate change

Nonetheless and most importantly: Beyond about the 2° and 3° C temperature increase, impacts on many ecosystems are likely to be irreversible making NBaS-NBS powerless.

- NBS failed interventions were attributed to a lack of understanding of the functioning of ecosystems and ecosystem services
- Nationally Determined Contributions (NDCs) to the UNFCCC that integrate adaptation and mitigation efforts in relation to oceans and coastal ecosystems are not being given the appropriate level of attention
- The prominence of NBS in the NDCs generally does not translate into robust evidence-based targets.
Only around 17% of NDCs involving NBaS set quantifiable and robust targets.
Even where measurable targets are set, it is unclear whether they will be sufficient to meet the adaptation needs

5. International scale: UNFCCC

Chronological order and brief summary of key findings



1994

Do we need to adapt?

N B a S



How do we adapt?



2019

How do we integrate adaptation to relevant socioeconomic and environmental policies and actions?

5. International scale: UNEP

Brief summary of key findings

- Mitigation is constrained into the present, adaptation on the other hand has to deal with the present conditions and future scenarios.
- In a real world application one cannot dissociate or draw a clear line of separation between CC and anthropogenic effects.
- Soil restoration is the most effective ecosystem restoration water NBS as these are capable of ensuring water supplies, moderating extreme events, controlling erosion and purifying water.
- One cannot simplify or undermine the scientific and technical principles behind engineering. In fact, the principles and metrics behind grey solutions are often absent in the case of NBS and EbA, unlike grey solutions.
- UN Decade on Ecosystem Restoration 2021-2030 spearheaded by the UNEP which gave NBS a very significant role in this decade.



UNITED NATIONS DECADE ON
**ECOSYSTEM
RESTORATION**
2021-2030



NBS

5. International scale

What should we know? The other side of the coin



Maladaptation

Complexity of adaptation science

Scalability

Wrong attributions

Uncertainties

Management and perpetuity

Green roofs example

Lack of awareness

Disservices

Privileging urban environments

Specificity

Contested definitions

A lack of operational clarity

Absence of sound scientific evidence

Feedback loops

Data timeline

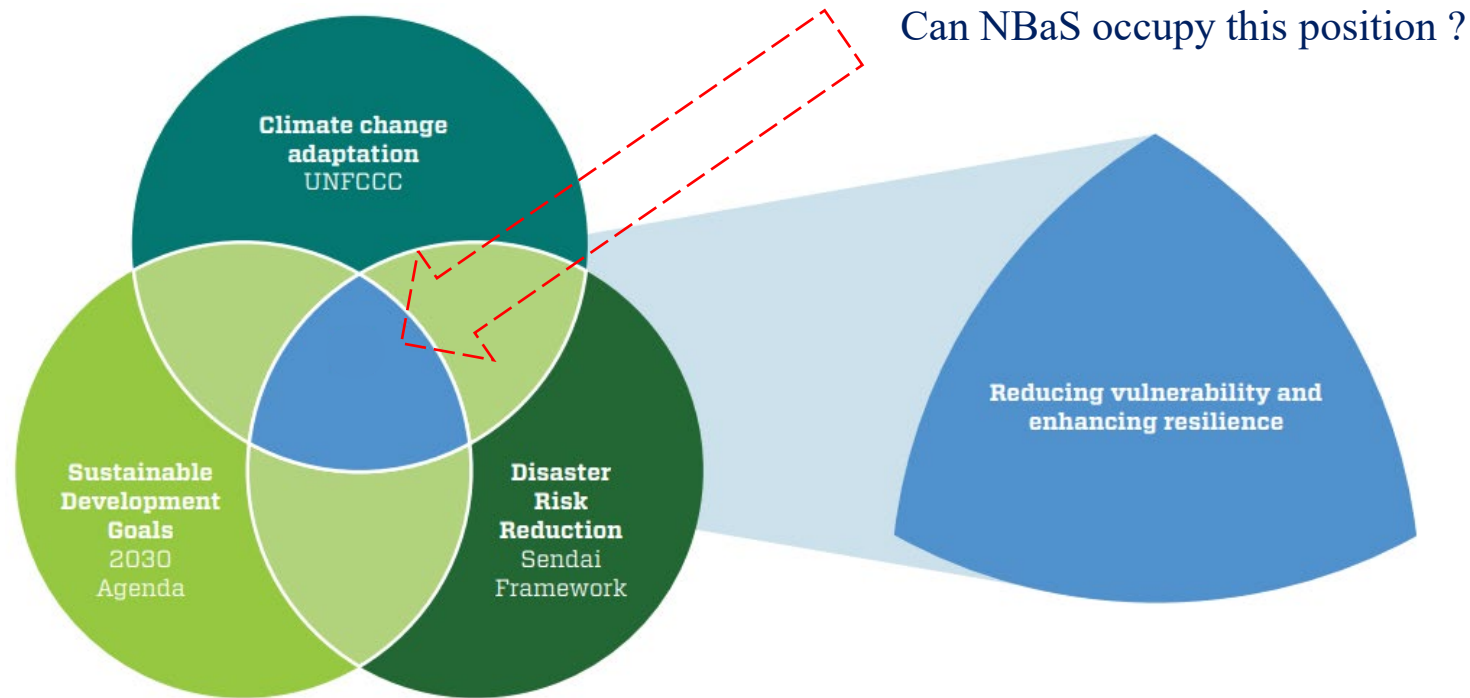
Disconnection between short-term actions and long-term goals

Adaptive management/governance
is still missing in the NBS framework

6. Perspectives and open-ended questions

1- Deriving research needs for effective mainstreaming of NBaS

2-



3- Should NBaS withstand climate or weather change ?

Contact and information

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