COASTAL CORRIDOR ALLIANCE

August 4, 2026

Comments submitted via email to: sustainability@costamesaca.gov

City of Costa Mesa
Economic and Development Services Department
77 Fair Drive 2nd Floor
Costa Mesa, CA 92626

RE: Comments on City's Draft Climate Action and Adaptation Plan

Dear Economic and Development Services Department,

Coastal Corridor Alliance (CCA) respectfully submits these comments on the City of Costa Mesa's draft Climate Action and Adaptation Plan (CAAP). We request to be notified of any and all future comment opportunities on the CAAP or its elements. Please add: *Admin@CoastalCorridor.org* to the distribution list.

We received notice from the City staff today that some of our comments will be incorporated into the Planning Commission staff report due out on Friday, August 7th.

Since the comment deadline for the Draft CAAP precedes that date and we are not privy to what those edits will be, and the current document does not reflect our previous suggestions, we would be reiterating many of our points here.

Some comments in this letter are new after reading the Draft CAAP, some comments reiterate previous points, but our original comment letter should be considered our main contributions, as they remain relevant (Attachment A).

We also respectfully request a meeting with staff to go through our areas of concern, see how our comments have been addressed and discuss elements of the plan.

Comments

CCA's comments on the 2026 Draft CAAP below are grouped by Plan Sector, with Sectors ordered by priority related to our comments. Each comment is referenced by Plan Sector, Location (PDF page), Plan Objective, Plan Action, and CCA's comment.

Chapter 1: Introduction
Location: Pg. 18
Text: "Urban Forestry, Open Space, and Nature-Based Resilience. The City continues to invest in urban greening and ecosystem health."
Comment: We do not see examples or plans in this document of ecosystem investments. We recommend examples be incorporated to strengthen the document.

Chapter 1: Introduction
Location: Pg. 19
Text: Co-benefit definition: "**Enhances the Natural Environment.** Efforts that positively impact the ecosystems, biodiversity, and natural resources within Costa Mesa."
Comment: We cannot find examples in the Draft Plan where a solution accomplishes this goal. It is listed as a co-benefit of some of the CAAP efforts, but is not shown how actions accomplish this specific co-benefit. Only natural resources (water and atmosphere) seem to be considered here, for human benefits. There is no mention of biodiversity elsewhere in the plan, and mentions of ecosystem benefits are not explained in the few places it appears (using less toxic chemicals, etc.). What do ecosystems here need, and how will the City provide that?

Chapter 5: Climate Action And Adaptation Strategy
Location: Natural and Urban Lands, Pg. 73
General Comment: As stated in our last comment letter (Attachment A), we feel Natural Lands should be treated fully and separately from Urban Lands. The following comments would apply to an individual Urban Lands Sector:

> Chapter 5: Climate Action And Adaptation Strategy
> **Location:** Natural and Urban Lands, Pg. 73
> **Text:** "The natural and urban lands sector focuses on enhancing carbon sequestration across parks, open spaces, and urban landscapes. This sector advances strategies that capture and store CO_2 in vegetation while expanding nature-based solutions to strengthen climate resilience."
> **Comment:** Focusing solely on carbon sequestration to mitigate human impacts by further

human engineering (even planting 'drought tolerant' gardens) is not ultimately effective. The focus should be on restoring natural carbon cycles or natural carbon distribution systems provided by naturally evolving ecosystems. More carbon should be stored in terrestrial biology (plants) and geology (soil) because humans have extracted and burned so much of it, but only when carbon is returned to native biological and geological systems will the naturally moderated carbon cycle exchanges be restored and balanced for a stable atmosphere. In short, we suggest the City consider ways to restore and improve the natural carbon cycle and distribution systems.

Chapter 5: Climate Action And Adaptation Strategy

Location: Table 5-1. Sectors, Objectives, and Actions Pg. 81-82
Actions: NU1.a.-e.; g.-h.: Build upon and implement the City's Urban Canopy and Land Assessment to encourage equitable tree canopy expansions.
Comment: Please include strong guidance and City commitments or ordinances to plant only native or edible plants and trees. Planting non-native trees works to further destroy native pollinators, plants, fungi, and other animals that create a stable environment. Planting non-natives should not a long term solution. It creates more of the problem it tries to solve with only short term human relief. Native plants are naturally drought tolerant and provide the needed shade to help with urban heat island effect. Utilitarian plants help with greening, community wellbeing, and food security. We support community garden and urban farming initiatives alongside native plant landscaping.

We also suggest:

- Adding incentives for participation in Homegrown National Park (https://homegrownnationalpark.org/).
- Working with the Orange County Chapter of the California Native Plant Society.
- Finding solutions to organize and consciously scale urban regenerative food production.
- Establishing restrictions against the propagation, sale, and planting of non-native invasive plants. To see a list of non-native invasive plants go to the California Invasive Plant Council website (https://www.cal-ipc.org/).

General Comments

Goals of the Plans
Text:
"The CAAP reflects an integrated approach to align multiple priorities while moving forward with

local climate action and adaptation. It provides clear opportunities to reduce emissions, prepare for climate impacts, and support a resilient, thriving community into the future." (pg. 15)

and,

"...forward-looking community, one where environmental responsibility and quality of life go hand in hand well beyond 2045." (pg. 65)
Comment: We agree with the goals, but what it would take to truly accomplish this needs further definition. If this plan were carried out fully, is the promise that true environmental responsibility and sustainability would be achieved? If not, what else is needed?

Terms & Topics
Term/Topic: "Growth"
Text:
"The City of Costa Mesa CAAP is a roadmap for the community to thrive, supporting continued growth and quality of life while preparing for and addressing climate change." (pg. 15)

and,

"The CAAP is designed to work with, not against, continued growth and development by supporting smart, sustainable land use, transportation, and infrastructure decisions. The City recognizes that the goal is not to slow progress but to ensure it happens responsibly and equitably." (pg. 15)
Comment: Please facilitate building a City-wide framework for how "growth" can be measured and discussed. Break down all categories of growth, quantify goals, and prove with research how competing goals are possible to be addressed concurrently.

What are the City's categories, definitions, and goals for "growth" and how they relate to each other." Define each growth category's trajectory and its impacts on true local regenerative ecological sustainability. Define goals, or what numbers / increase is acceptable, for how long. Is there a cap, threshold, or benchmark for each category?

- Natural World (re-growth)
  - biodiversity
  - natural lands
  - habitat
- Human World

- economic
- population
  - "Costa Mesa's strong economy and relatively low exposure to climate hazards as compared to the region may make it an attractive destination for climate-displaced populations from other parts of Southern California. While this may bring economic opportunities, it could also exacerbate existing housing affordability pressures." (pg. 47)
- human land use expansion
- building expansion (out or up?)
- other?

We did a keyword search with the following results

Native landscaping (three uses, one page, one sector: Water and Wastewater. Not found in Natural and Urban Lands)
Native plants (0 mentions)
Wildlife (0 mentions)
Habitat (0 mentions)
Natural lands: No definition or discussion is in the plan
Ecosystem (some nominal mentions, with no specific actions attached)

Glossary (Pg. 101-110): Please include comprehensive and specific definitions for the following:

- **Natural environment:** This is purported to be enhanced, but is never defined (pg. 19)
- **Natural lands:** What does this mean to the City?
- **Nature-based solutions:** how does this include or not include naturally evolving systems?
- **Urban greening:**
  - drought tolerant landscaping
  - shade trees (native?)
  - native plant / pollinator landscaping
  - edible or usable plants landscaping for food security and carbon cycles
- **Environmental Responsibility:**
  - to humans?
  - to pets?
  - to native plants and animals?
- **Growth / Smart Growth**

Conclusion

We would like to see the City's CAAP plans include more specificity for steering the community toward harmony with the natural world as the only long term effective solution to anthropogenic climate change. We wish for a base level of intention in Costa Mesa's CAAP that matches other cities' CAAPs, like San Diego, Santa Cruz, and others. Notably missing is a plan and framework for the necessity of recovering local native species and habitats as our only long-term nature-based solution for climate change.

We hope that any efforts made in the name of 'urban greening', 'green industry workforce opportunities,' 'nature-based solutions,' 'green business programs,' put **native plants and ecosystems** in its primary position of priority. Without this, these programs will only make nominal temporary living improvements for humans while continuing to contribute to the underlying problem of imminent ecosystem collapse.

We ask that all **communications and outreach** to the public be honest, realistic, and carefully researched. Please avoid greenwashing or presenting false positivity or a false narrative of the reality of our environmental impacts and the real world consequences in City communications and outreach.

We appreciate the work of City staff to increase sustainability in Costa Mesa. Should you have questions, please reach out to Paul Waggoner at: (949) 820-9094.

Sincerely,



Terry M. Welsh, MD
Board President

Attachments: 1 - CCA Letter to Costa Mesa on CAAP dated May 26, 2026

COASTAL CORRIDOR ALLIANCE

May 25, 2026

Comments submitted via email to: sustainability@costamesaca.gov

City of Costa Mesa
Economic and Development Services Department
77 Fair Drive 2nd Floor
Costa Mesa, CA 92626

RE: Comments on City's Draft Climate Action and Adaptation Plan Policies

Dear Economic and Development Services Department,

Coastal Corridor Alliance (CCA) respectfully submits these comments on the City of Costa Mesa's draft Climate Action and Adaptation Plan (CAAP). We request to be notified of any and all future comment opportunities on the CAAP or its elements. Please add: *Admin@CoastalCorridor.org* to the distribution list.

Background

CCA, formerly the Banning Ranch Conservancy, led the decades-long effort to protect and create a permanent public open space of the 400-acre Banning Ranch property located between the borders of Costa Mesa, Newport Beach, and Huntington Beach, along the tidal influx zone of the Santa Ana River. Escrow closed in December 2022, permanently protecting 387 acres of Banning Ranch. The title was transferred to the Mountains Recreation and Conservation Authority (MRCA), a local joint powers authority that manages over 85,000 acres of parkland in Southern California. The property is now known as the Frank and Joan Randall Preserve/Genga (or simply Randall Preserve/Genga).

Our vision of conservation extends beyond the Randall Preserve/Genga to encompass the entire Coastal Corridor from the Pacific Ocean up the Santa Ana River to Adams Street in Costa Mesa. We seek to restore our natural lands, ensure functional habitat for wildlife, and promote the critical need for native biodiversity survival through education and built-environment reform in today's context of late-stage ecological destruction.

Comments

General Comments

We would like to see climate and sustainability planning in Costa Mesa, or any location, first inventory and prioritize the needs of the preexisting and preeminent local native ecosystems. Local, regional, and global ecosystems serve as Earth's irreplaceable, self-regulating life-support systems.

Climate change, environmental injustice, and resource collapses are not just emissions, pollution, and human resource efficiency problems—they are symptoms of a deeper root cause: the destruction of native biodiversity by the expanding built human environment. Climate science points to the biodiversity crisis at the center, and prioritizes restoration over innovation (**Attachment 1**).

While decarbonizing Costa Mesa should be a goal the City strives for in this CAAP, our primary and most effective focus would be to shift our relationship with nature and cede land and resources back to local, regional, and global native living systems. Engineering, technology, and green planning cannot effectively reduce human impacts to accommodate all of what modern human populations want and need, *and* effectively replicate or replace the natural systems that regulate our air, water, and carbon cycles.

Global, Regional, Local: To make our local air, water, and soil cleaner is crucial. But for as long as our populations require remote resources for support, we simply push our air, water, and soil impacts elsewhere. This is just another form of (out of sight and out of mind) environmental injustice for humans, and reinforces the ecological destruction that drives the global climate crisis that local CAAPs try to address. Those global impacts come back around at larger scales to affect all local places too, even if local areas end up with cleaner resources. Climate action in this frame looks like taking responsibility for all of our local and remote impacts, reducing or ending our reliance on remote water, air, mineral, and food resources, and reorienting our local infill spaces for food, sustainable goods production, and native biodiversity recovery.

Climate action based on ecology prioritizes the restoration of all of our suitable natural areas to native habitats, and creating/ceding massive amounts of local, regional, and global space back for wildlife and habitat connectivity.

We hope our comments encourage Costa Mesa's CAAP toward actions that help recover biodiversity as a first and most effective priority.

Prioritized Comments

Our comments on the 2026 Draft CAAP below are grouped by Plan Sector, with Sectors ordered by priority related to our comments. Each comment is referenced by Plan Sector, Location (PDF page), Plan Objective, Plan Action, and CCA's comment.

Sector: Natural and Urban Lands
Location: Pg. 9
Comments: We respectfully request that this Sector gets careful and robust reframing. Natural and Urban lands are very different, which should warrant separate Sectors. The existing action items apply almost exclusively to Urban Lands and their orientation for human benefits rather than prioritizing Natural Lands and (local, native) nature-based solutions.

- **We request Natural Lands become a new, banner 'Sector' of the CAAP plan** focusing on clearly defined, legally bound native biodiversity goals. Actions should support ecosystem recovery on Natural Lands, as this is our best and most effective action to take to mitigate anthropogenic climate change.
    - We request, Costa Mesa add specific restoration and rewilding goals, actions, and ordinances as the European Union does, that remove invasive plants, restore already-available open spaces to functioning locally native habitats, and remove human infrastructure that blocks otherwise available native habitats.
    - Please include consideration of Costa Mesa's position within our bioregion and within the California Floristic Province, acknowledging our City's impact on the fragmentation of native habitats, and its effects on the climate and livability of our built world, as Santa Barbara does in its CAAP.
    - Other documents for reference:
        - CAAPS from San Diego, Santa Cruz
        - Costa Mesa General Plan, Conservation Element
        - Fairview Park Master Plan's California Environmental Quality Act (CEQA) Initial Study/Mitigated Negative Declaration Appendices B-1 and C-3.

- **Urban Lands (Existing Sector):**
    - Native or edible plants: We request all rules, references, outreach, educational or community programs related to the use of plants (Plan-wide) including tree canopies, tree planting, tree replacements, urban greening, shade plants, drought tolerant plants, or landscaping, make a clear prioritization for either locally native plants or edible cultivars for local food production. Please clearly deprioritize or ban planting non-native or non-edible plants in CAAP actions and policies, as they contribute to biodiversity loss. Instead, please share the benefits of locally native plant species and local food production as solutions.

Native plants provide drought tolerance, shade / canopy, sequestration, and more, while also supporting native pollinators, wildlife, natural soil composition, natural water treatment for the watershed (except for Action d., see Water and Wastewater comment).

- Consider adding an action to include public promotion and incentives for residents and developments to participate either in 'homegrown national park' native landscapes (https://homegrownnationalpark.org/) (CCA would be glad to help strategize), or micro-farmed food production for locals.
- We support all initiatives that incentivize and expand local food production within infill spaces. Please specify that no additional natural lands encroachments should occur for the sake of food production. We have some other incentivized ideas that support job creation that we can share upon request.
- All civic tree installations or replacements must be to native trees or food production. See Pasadena's urban forestry information: https://www.cityofpasadena.net/public-works/urban-forestry/
- Consider policies to block the sale of known invasive plant species from nurseries, garden centers, and more. Look to California Native Plant Society (CNPS), California Invasive Plant Council (CAL-IPC), and Ron Vanderhoff at Roger's Gardens for consultation (rvanderhoff@sbcglobal.net).
- Please define 'Urban Greening' to include recovery for locally native species, Dark Sky, bird safe windows, invasive honeybee and other invasive pollinator management, and more.

Sector: Water and Wastewater
Location: Pg. 6
Comment: We hope this Sector gets a more robust nature-first framework. Local watersheds and dependent native ecosystems must be primary considerations, as they comprise the foundation of all human and nonhuman life of a place.

- We request that all references, examples, and methods related to the use of plants for shade, drought tolerance, or any other benefits be focused exclusively on diverse locally native plant palettes, or cultivars that provide local human food production. We ask the City to commit to working with consultants from groups such as the CNPS, CAL-IPC, and others to create native wildlife friendly landscapes. Ornamental plant palettes support invasive pollinators and other non-native species, whose presence displaces and competes with native biodiversity.
- Local watersheds are engineered to cut off dependent ecosystems through hardened walls and barriers, which would need to be prioritized for removal to recover biodiversity. Please consider forming a framework for long term watershed infrastructure removal.
- Add an action item focused on low-impact development (LID) that mimics natural hydrology. Ensure stormwater capture basins, bioswales, and daylighted drainage systems are designed as

living wetlands rather than concrete or synthetic retention cells. This filters urban runoff naturally before it reaches the ocean while providing immediate avian and amphibian habitats.

Sector: People and Community
Location: Pg. 10 - 11
Comment: We generally support the action items, with a few critiques listed below. We urge the City:

- To prioritize implementing long term solutions like native habitat and watershed restoration that decrease the needs for short term solutions.
- Not to promote 'Green' jobs or businesses that might trade local immediate improvements for global or long term impacts.
- Prioritize sustainably sourced natural materials in efforts to provide relief, and avoid plastics which harm native ecosystems' ability to thrive and regulate the planetary temperatures.

Sector: People and Community
Location: Pg. 11
Objective: PC3: Build City and Regional Capacity for CAAP Implementation
Action: "d. Coordinate with the following agencies on dam operational planning and related flood risks:

• U.S. Army Corps of Engineers Los Angeles District
• Irvine Ranch Water District
• County of Orange"

Comment: Our watersheds are highly engineered, which cuts off their natural functions to support the ecosystems' environmental regulatory systems. Watershed infrastructure might protect human homes from floods, but they accelerate the trajectory toward a warming environment. Watershed infrastructure must be removed, not added for short term climate relief. City policies should reflect this priority, and City involvement in regional planning should promote this practice. Instead of cutting off river and tide functions to protect infrastructure, infrastructure should move out of the way of rivers and tides (**Attachment 2**).

Sector: People and Community
Location: Pg. 11
Objective: PC4. Foster Local Sustainable Practices
Action: "e. Engage local Non-Governmental Organizations (NGOs) and compile a list relative to their interests and capabilities on a variety of topics related to climate action and adaptation, such as distributing related news or grant opportunities, or participating in or facilitating volunteer events such as clean ups or tree plantings."
Comment: CCA is available and willing to engage with the City on these topics and activities.

Sector: On-Road Transportation
Location: Pg. 2
Objective: T1. Transition to Electric Vehicles
Comment: We generally support the listed action items. Please add actions to incentivize and plan electrification deployment within a closed-loop second-life framework to reduce rare earth mining impacts. Local improvements should not come with additional global impacts **(Attachment 3)**.

Sector: On-Road Transportation
Location: Pg. 2
Objective: T2. Promote Walking and Biking
T3. Reduce Single-Occupancy Vehicle Trips
T4. Increase Public Transportation Use
Comment: We generally support the action items, though not at the expense of more use of plastics or other environmentally harmful materials or activities. We request the City limit materials to sustainably sourced natural materials and focus on design efficiency, biodegradation, and simplification.

Sector: On-Road Transportation
Location: Pg. 2
Objective: T5. Support Smart Growth
Comment: We urge the City to consider how biodiversity is already too constrained, and how continued growth works against climate adaptation.

Sector: Energy and Buildings
Location: Pg. 4
Objective: E1. Reduce Energy Demand in Buildings
Action: "c. Seek grants to offer incentives for cool roofs and walls during roof replacements or renovations."
Comment: Please consider policies / building requirements which include other passive cooling and heating systems of various types (air towers, trombe walls, etc.) for all new construction. Consider hybrid local-earth building materials to reduce resource needs, plastic use, promote in-ground infill building, and more.

Sector: Energy and Buildings
Location: Pg. 4
Objective: E2. Decarbonize Building Energy Use
Comment: We support actions a. - c. However, for d., we recognize that Green Building standards still have major tradeoffs, particularly in the prolific use of plastic and other harmful materials. Consider celebrating those that go beyond Green Building by sustainably sourcing natural building materials.

Sector: Energy and Buildings
Location: Pg. 4
Objective: E3. Increase Carbon-Free Energy Supply
Comment: We provide our general support. Find incentives / ways to keep electrification circular, engage in second-life platforms (See comment above).

Sector: Solid Waste
Location: Pg. 7
Objective: SW1. Reduce Waste Generation
Comment:

- We provide our support for all, with special support for Action b**.**
- Consider adding actions for easy City-supported e-waste drop-off / recycling, and facilities for handling fats, oils, and grease waste.
- Please consider having City Departments join the OC Trash and Debris Task Force quarterly meetings CCA participates in. Email jesse.aragon@pw.oc.gov to participate.

Sector: Off-Road Equipment
Location: Pg. 8
Objective: OR1. Accelerate Zero-Emission Off-Road Equipment Adoption
Comment: We provide our general support. However, see the above comments on circular electrification and second-life programs to reduce mining impacts.

Sector: Municipal
Location: Pg. 12 - 13
Comment: We can provide our general support for action items, with relevant above comments for other Sectors applied: native-first plantings, second-life electrification, embargo on plastic infrastructure, etc.

Conclusion

We appreciate the City's work on the draft CAAP. Thank you for the opportunity to provide comments on this plan. We understand that ecosystem centrality with its needs and limits have not made its way into widespread public discourse or planning solutions. It's a change in paradigm compared to what most of

us were raised to think and believe about what we humans can or can't sustainably do. We respectfully submit our comments with this in mind.

Should you have questions, please reach out to Paul Waggoner at: (949) 820-9094.

Sincerely,



Terry M. Welsh, MD
Board President

Attachments:
1 - UN: Biodiversity - our strongest natural defense against climate change
2 - Restoring Free-flowing Rivers in Europe
3 - Project Closed Circuit: Helping Cities Lead on EV Battery Circularity

Attachment 1
Source: https://www.un.org/en/climatechange/science/climate-issues/biodiversity

Climate Action (/en/climatechange)

Biodiversity - our strongest natural defense against climate change



The Earth's land and the ocean serve as natural carbon sinks, absorbing large amounts of greenhouse gas emissions. Conserving and restoring natural spaces, and the biodiversity they contain, is essential for limiting emissions and adapting to climate impacts.

Biological diversity — or biodiversity (https://www.unep.org/unep-and-biodiversity?_ga=2.141360562.1630766004.1661203745-120134052.1634700687) — is the variety of life on Earth, in all its forms, from genes and bacteria to entire ecosystems such as forests or coral reefs. The biodiversity we see today is the result of 4.5 billion years of evolution, increasingly influenced by humans.

Biodiversity forms the web of life that we depend on for so many things – food, water, medicine, a stable climate, economic growth, among others. Over half of global GDP (https://blogs.worldbank.org/voices/business-case-nature#:~:text=According%20to%20the%20World%20Economic,have%20created%20new%20biodiversity%20funds) is dependent on nature. More than 1 billion people rely on forests (https://www.un.org/en/desa/5-things-you-should-know-about-how-forests-benefit-people-and-planet) for their livelihoods. And land and the ocean absorb more than half of all carbon emissions.

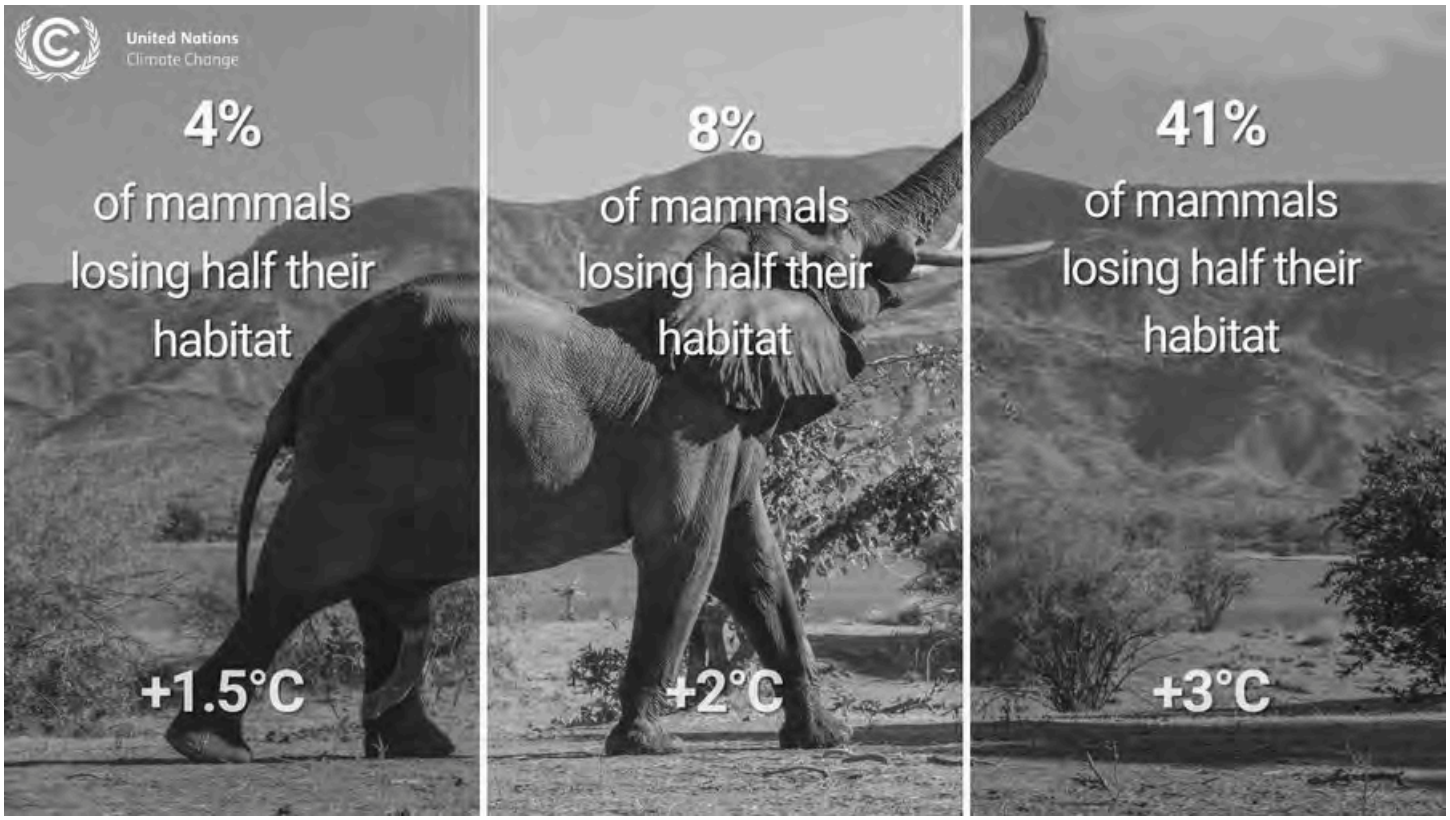
But nature is in crisis. Up to one million species (https://ipbes.net/news/Media-Release-Global-Assessment) are threatened with extinction, many within decades. Irreplaceable ecosystems like parts of the Amazon rainforest (https://wmo.int/media/news/role-of-amazon-carbon-sink-declines-nature-study) are turning from carbon sinks into carbon sources due to deforestation. And 85 per cent of wetlands (https://ipbes.net/news/Media-Release-Global-Assessment), such as salt marshes and mangrove swamps which absorb large amounts of carbon, have disappeared.

How is climate change affecting biodiversity?

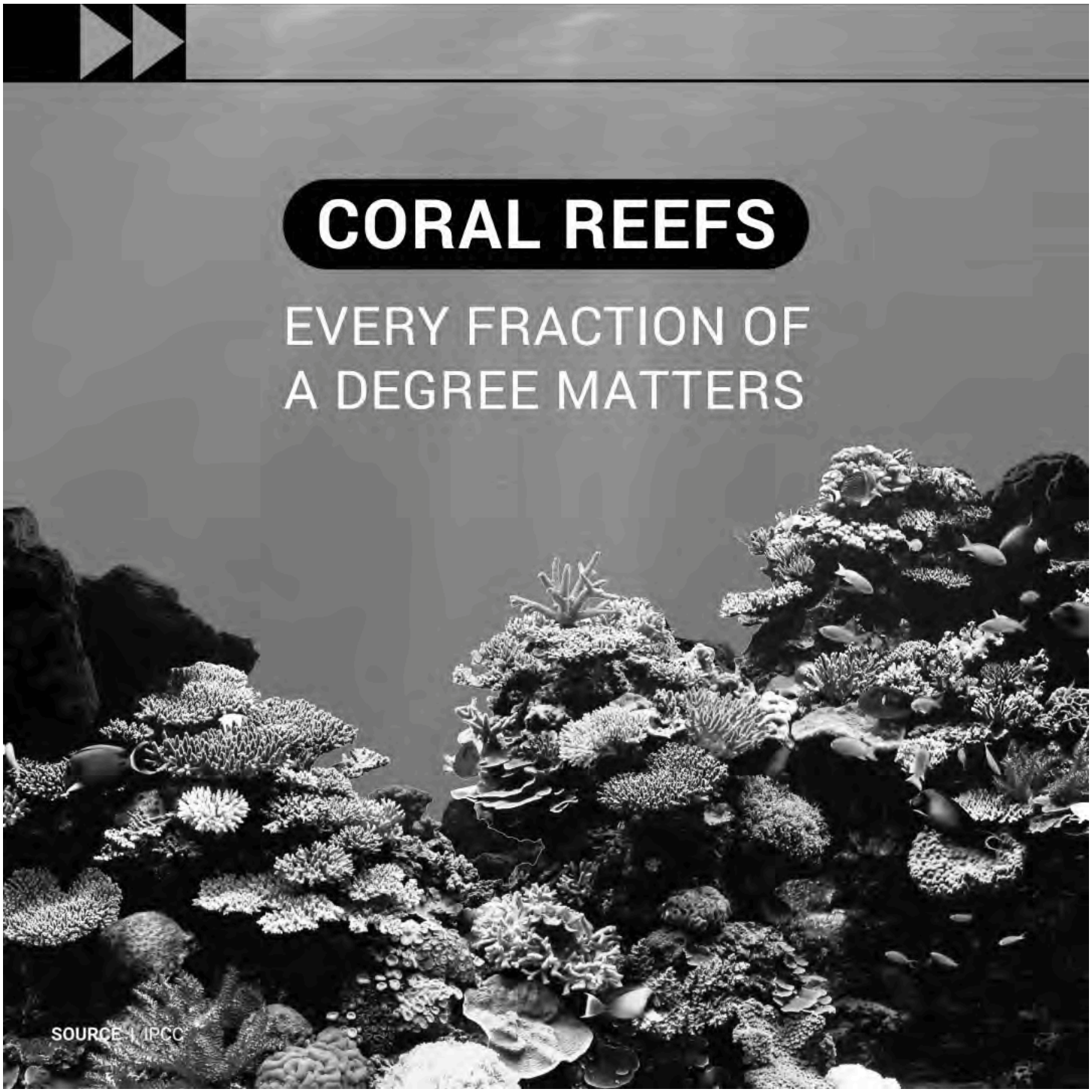
The main driver of biodiversity loss remains humans' use of land (https://www.unccd.int/land-and-life/biodiversity/overview) – primarily for food production (https://www.unep.org/news-and-stories/press-release/our-global-food-system-primary-driver-biodiversity-loss). Human activity has already altered over 70 per cent of all ice-free land. When land is converted for agriculture, some animal and plant species may lose their habitat and face extinction.

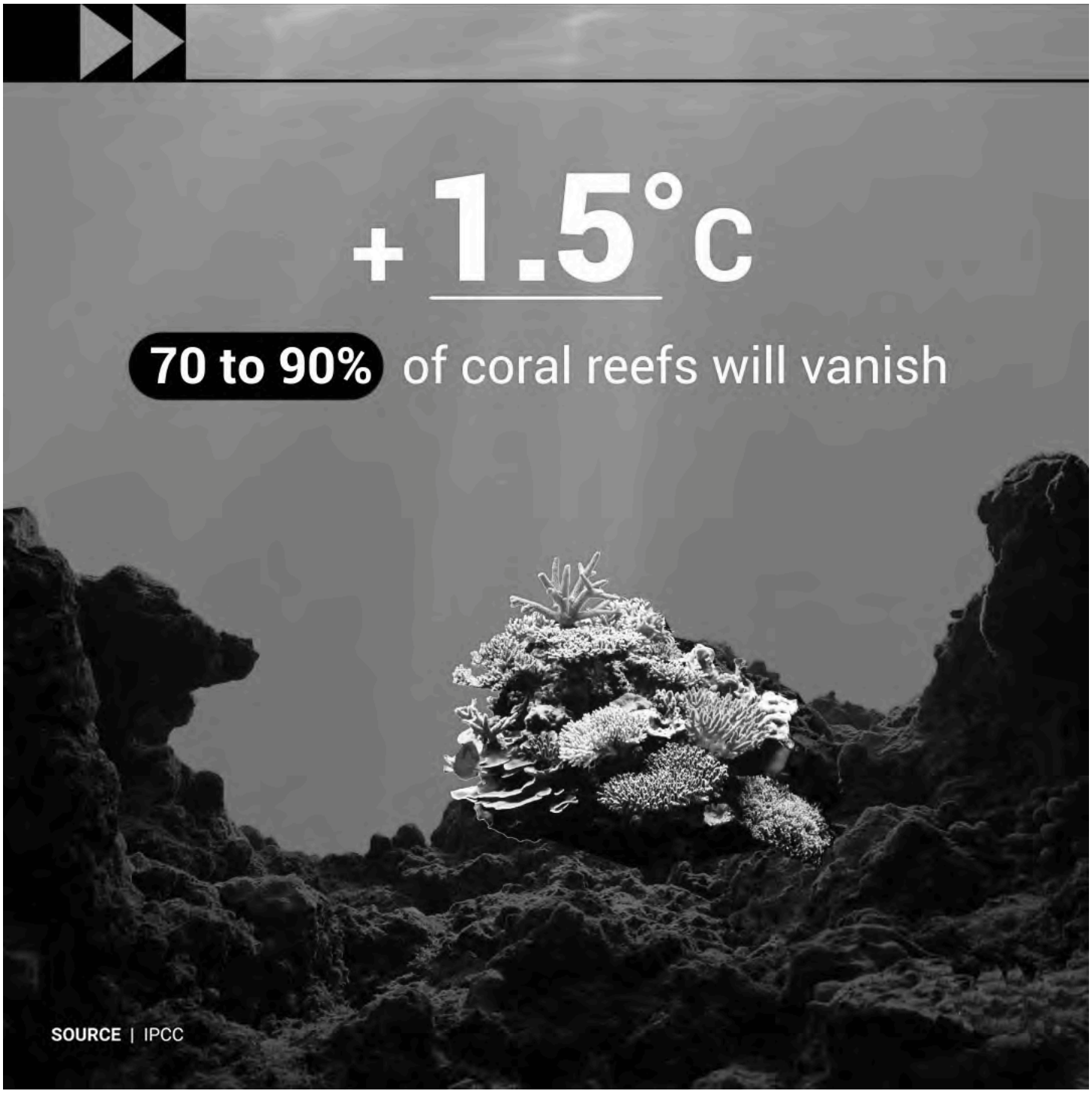
But climate change (https://www.un.org/en/climatechange/what-is-climate-change) is playing an increasingly important role in the decline of biodiversity. Climate change has altered marine, terrestrial, and freshwater ecosystems around the world. It has caused the loss of local species, increased diseases, and driven mass mortality of plants and animals, resulting in the first climate-driven extinctions.

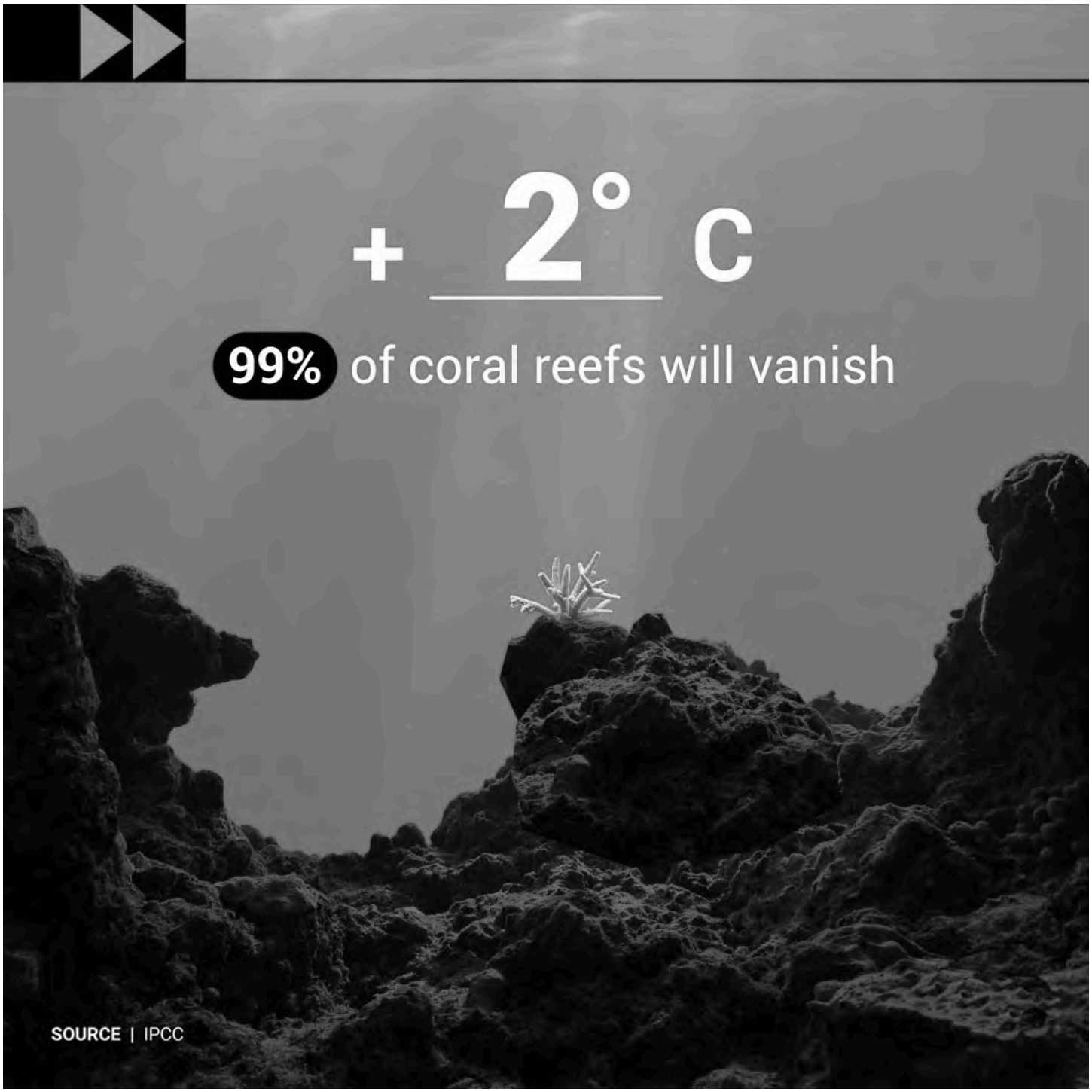
On land, higher temperatures have forced animals and plants to move to higher elevations or higher latitudes, many moving towards the Earth's poles, with far-reaching consequences for ecosystems. The risk of species extinction (https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_CCP1.pdf) increases with every degree of warming.



In the ocean, rising temperatures increase the risk of irreversible loss of marine and coastal ecosystems (https://www.ipcc.ch/report/ar6/wg2/chapter/chapter-3/). For instance, 14 per cent of the coral (https://www.unep.org/topics/ocean-seas-and-coasts/blue-ecosystems/coral-reefs) from the world's coral reefs was lost between 2009 and 2018, mostly due to climate change, and further warming threatens to destroy almost all remaining reefs.


CORAL REEFS
EVERY FRACTION OF
A DEGREE MATTERS
SOURCE | IPCC


+1.5°c
70 to 90% of coral reefs will vanish
SOURCE | IPCC



Overall, climate change affects the health of ecosystems (https://www.who.int/news-room/fact-sheets/detail/biodiversity-and-health), influencing shifts in the distribution of plants, viruses, animals, and even human settlements. This can create increased opportunities for animals to spread diseases (https://www.who.int/news-room/fact-sheets/detail/biodiversity-and-health) and for viruses to spill over to humans. Human health can also be affected by reduced ecosystem services, such as the loss of food, medicine and livelihoods provided by nature.

Why is biodiversity essential for limiting climate change?

When human activities produce greenhouse gases, around half of the emissions remain in the atmosphere, while the other half is absorbed by the land and ocean (https://www.unep.org/news-and-stories/story/five-ecosystems-where-nature-based-solutions-can-deliver-huge-benefits). These ecosystems – and the biodiversity they contain – are natural carbon sinks, providing so-called nature-based solutions to climate change.

Protecting, managing, and restoring forests (https://www.un-redd.org/), for example, offers roughly two-thirds of the total mitigation potential of all nature-based solutions. Despite massive and ongoing losses, forests still cover more than 30 per cent of the planet's land.

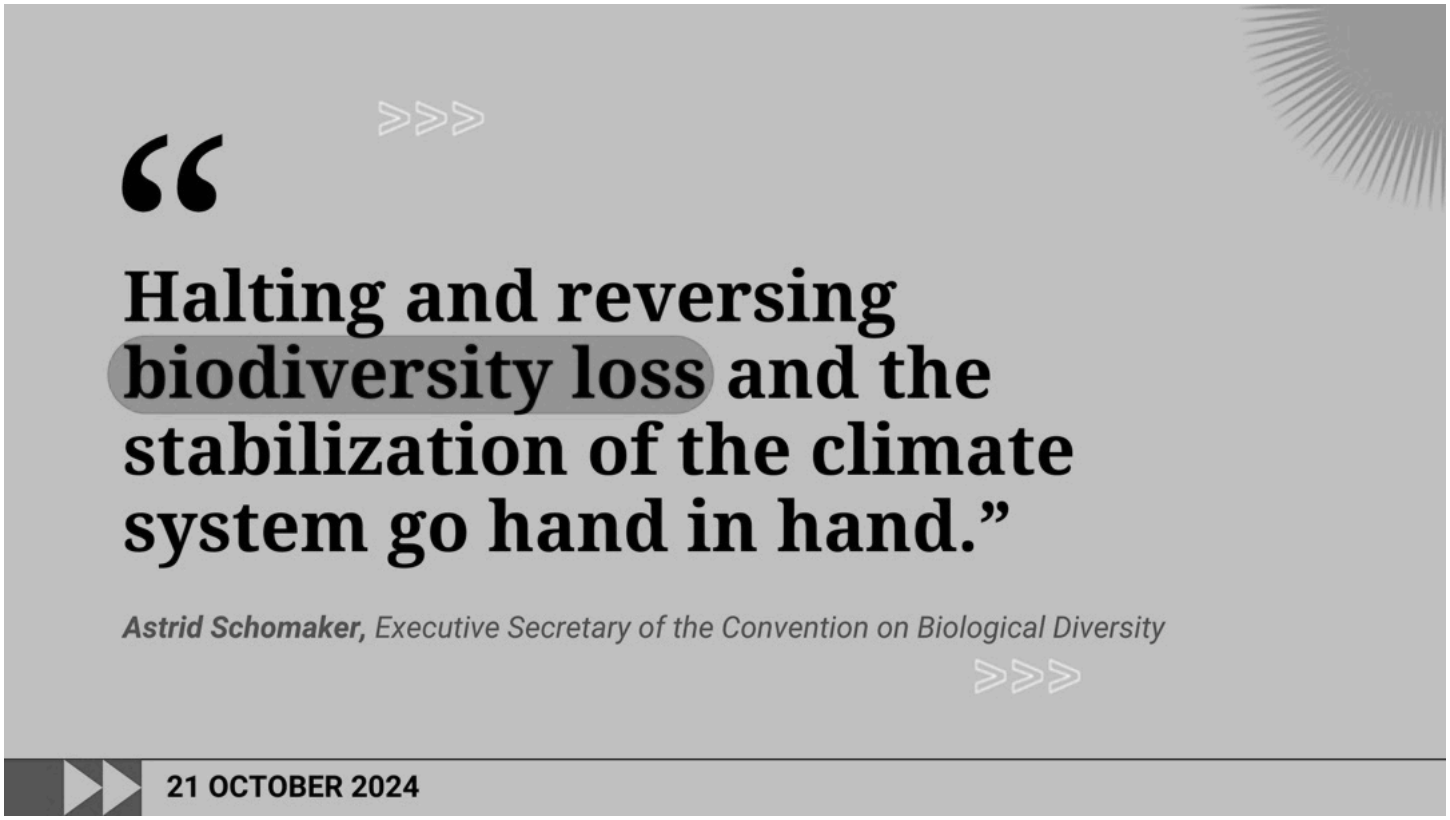
Peatlands (https://www.unep.org/news-and-stories/story/peatlands-store-twice-much-carbon-all-worlds-forests) – wetlands such as marshes and swamps – cover only 3 per cent of the world's land, but they store twice as much carbon as all the forests. Preserving and restoring peatlands means keeping them wet so the carbon doesn't oxidize and float off into the atmosphere.

Ocean habitats such as seagrasses and mangroves (https://www.unep.org/explore-topics/oceans-seas/what-we-do/protecting-restoring-blue-carbon-ecosystems/why-protecting) can also sequester carbon dioxide from the atmosphere (https://unfccc.int/news/protecting-the-ocean-critical-for-climate-action) at rates up to four times higher than terrestrial forests can. Their ability to capture and store carbon make mangroves highly valuable in the fight against climate change.

Conserving and restoring natural spaces (https://wedocs.unep.org/xmlui/bitstream/handle/20.500.11822/35360/NatClim.pdf), both on land and in the water, is essential for limiting carbon emissions and adapting to an already changing climate. About one-third of the greenhouse gas emissions reductions needed (https://www.unep.org/resources/factsheet/nature-climate-action) in the next decade could be achieved by improving nature's ability to absorb emissions.

Is the UN tackling climate and biodiversity together?

Climate change and biodiversity loss (as well as pollution) are part of an interlinked triple planetary crisis (https://unfccc.int/blog/what-is-the-triple-planetary-crisis) the world is facing today. They need to be tackled together (https://news.un.org/en/story/2021/04/1090762) if we are to advance the Sustainable Development Goals (https://www.un.org/sustainabledevelopment/sustainable-development-goals/) and secure a viable future on this planet.



Governments deal with climate change and biodiversity through two different international agreements – the UN Framework Convention on Climate Change (https://unfccc.int/) (UNFCCC) and the UN Convention on Biological Diversity (https://www.cbd.int/) (CBD), both established at the 1992 Rio Earth Summit.

Similar to the historic Paris Agreement (https://www.un.org/en/climatechange/paris-agreement) made in 2015 under the UNFCCC, parties to the Biodiversity Convention in December 2022 adopted an agreement for nature, known as the Kunming-Montreal Global Biodiversity Framework (https://www.cbd.int/article/cop15-final-text-kunming-montreal-gbf-221222), which succeeds the Aichi Biodiversity Targets (https://www.cbd.int/sp/targets/) adopted in 2010.

The framework includes wide-ranging steps to tackle the causes of biodiversity loss worldwide, including climate change and pollution, and should work in synergy with the Paris Agreement (https://press.un.org/en/2021/sgsm20959.doc.htm).

“Delivering on the framework will contribute to the climate agenda, while full delivery of the Paris Agreement is needed to allow the framework to succeed,” said Inger Andersen (https://www.unep.org/news-and-stories/speech/towards-strong-targeted-post-2020-global-biodiversity-framework), the head of the UN Environment Programme. “We can’t work in isolation if we are to end the triple planetary crises.”

At COP15 in December 2022, governments met in Montreal, Canada (https://www.unep.org/events/conference/un-biodiversity-conference-cop-15), and agreed on the new framework to address biodiversity loss, restore ecosystems and protect the rights of Indigenous Peoples, who suffer disproportionately (https://www.unep.org/news-and-stories/story/indigenous-peoples-and-nature-they-protect) from biodiversity loss.

“Indigenous Peoples, people of African descent, and local communities are guardians of our nature,” said the UN Secretary-General. “Their traditional knowledge is a living library of biodiversity conservation. They must be protected. And they must be part of every biodiversity conversation.”

At the meeting, the parties also adopted the Multilateral Mechanism on the fair and equitable sharing of benefits arising from the use of digital sequence information (https://www.fao.org/cgrfa/topics/digital-sequence-information/en/) on genetic resources.

In November 2024, at COP16 in Cali, Colombia, countries reached a historic consensus, including on the functioning of a fund, known as the Cali Fund, aimed at mobilizing new streams of funding for biodiversity action worldwide and boosting the implementation of the framework.

The Cali Fund was launched (https://www.un.org/sustainabledevelopment/blog/2025/02/press-release-cop16/) in Rome, Italy, in February 2025 on the margins of the resumed session of COP16. It is set to receive contributions from private sector entities making commercial use of data from genetic resources, with the aim to raise an additional $200 billion each year by 2030 to close the global biodiversity finance gap.

“Those profiting from nature cannot treat it like a free, infinite resource. They must step up and contribute to its protection and restoration,” the UN Secretary-General said.

Learn more

Read the UN Secretary-General’s speech at the High-Level Segment of COP16 (https://www.un.org/sg/en/content/sg/statement/2024-10-29/secretary-generals-remarks-the-high-level-segment-of-cop16-biodiversity-trilingual-delivered-scroll-down-for-all-english) in November 2024, and his remarks ahead of the resumed opening session of COP16 in February 2025 (https://www.un.org/sg/en/content/sg/statement/2025-02-25/secretary-generals-message-the-resumed-opening-session-of-cop16-biodiversity).

Watch our interview with Elizabeth Mrema (https://www.un.org/en/climatechange/thought-leaders-elizabeth-mrema), former Executive Secretary of the United Nations Convention on Biological Diversity.

Hindou Ibrahim: Living in harmony with nature (https://www.un.org/en/climatechange/thought-leaders-hindou-ibrahim)

"Indigenous peoples are a solution, we are not only a victim of the climate change," says SDG Advocate and Indigenous rights activists Hindou Ibrahim.



(https://www.un.org/en/climatechange/elliott-harris-measure-value-nature)

Elliott Harris: Measure the value of nature – before it's too late (https://www.un.org/en/climatechange/elliott-harris-measure-value-nature)

UN Chief Economist Elliott Harris introduces a ground-breaking shift in valuing nature as a way of making more informed decisions about economies, climate action and the protection of biodiversity.

Attachment 2
Source: https://www.nature.org/en-us/about-us/where-we-work/europe/stories-in-europe/restoring-free-flowing-rivers-in-europe/



CONFLUENCE The Morača and Zeta rivers meet in Montenegro. © TNC/Chip Carroon

STORIES IN EUROPE

Restoring Free-flowing Rivers in Europe

A practitioner's toolkit for dam removal

SHARE

In This Guide:

1. Introduction

2. Why Remove Dams

3. Project Phases

Financing Options

OVERVIEW

This is an introductory resource guide for those new to restoring rivers through dam removal.

In the coming year, the toolkit will be developed into a more comprehensive guide and training for practitioners. In the interim, we would be honored to have your input on the scope and content, to better support your needs. For the latest news and developments on barrier removal, please have a look at our European Case Studies, Financing Options and Resources pages.

1. Introduction

Rivers provide freshwater and fisheries to sustain us, support our farms, drive industry, and power our homes. We rely on rivers as transportation corridors connecting our seaports with inland towns. And we value our rivers for recreation such as fishing, boating, and swimming.

Such heavy use, however, has impacted the health of this important resource globally.

With more than 1 million dams, European rivers are among the most developed. This cumulative impact is one of the leading causes of the **> 80% decline of freshwater biodiversity and a loss of 55% of the abundance of monitored migratory fish populations.**

While many dams in Europe deliver invaluable services – like critical water supplies and flood risk reduction – it is estimated that **tens of thousands no longer serve their**

flood-risk reduction, and more cost-effective ways of producing renewable energy, provide new solutions to better meet our needs.

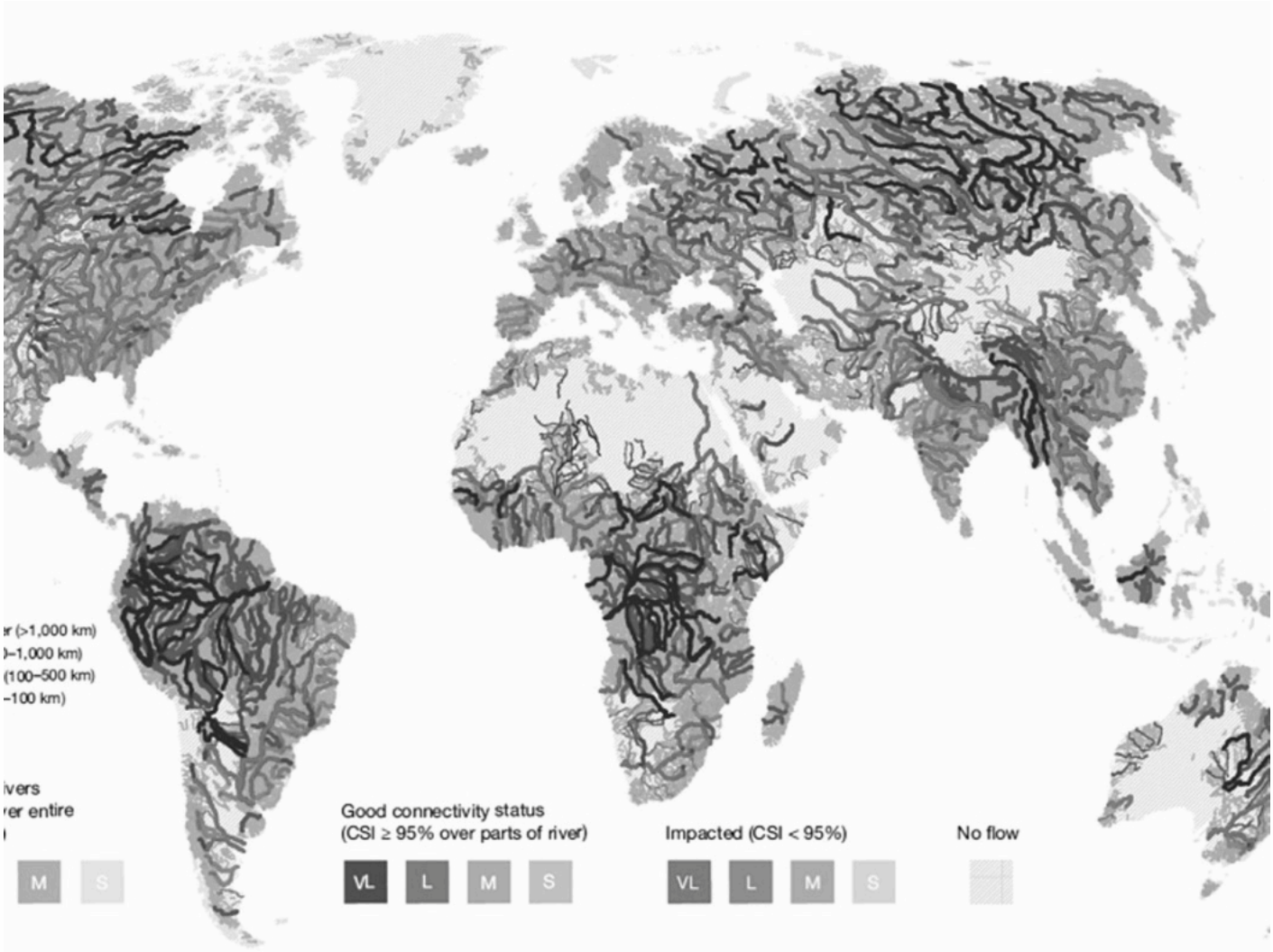


FIGURE 1 Global status of free-flowing rivers (Grill 2019).

Removing barriers to river health

This creates an unprecedented opportunity to re-think our infrastructure and restore European rivers, their biological diversity and the vital services they provide our communities. And we're doing just that.

To date, The Nature Conservancy has worked with partners to **remove more than 100 stream barriers in the U.S.**, restoring thousands of river kilometers which provide social and ecological benefits.

We've used this experience to invest deeply in the science of 'where,' to identify which future projects will provide the greatest ecological benefits, the science of 'how,' to understand which approaches work, and to pursue innovative policies and finance solutions that move beyond project-by-project decisions to address the scale of the problem for people and nature.

In Southeast Europe, we are sharing our expertise with local partners to support the development of their restoration strategies and, more broadly, we are partnering with Dam Removal Europe to support the growing movement to restore European rivers.

MOVE THE SLIDER ON THE IMAGE BELOW TO SEE THE BEFORE AND AFTER OF THE ENNERDALE MILL WEIR REMOVAL.



ENNERDALE MILL WEIR REMOVAL Ennerdale Mill Weir removal is an example of a successful project that was accomplished with limited complexities while managing sediment removal for protected mussels. © West Cumbria Rivers Trust

Aim of this toolkit

We've summarized a collection of introductory resources for partners who are generally new to using dam removal as a tool for river restoration and are interested in learning how to approach a new project or engage in an existing project.

The toolkit synthesizes resources for communicating the benefits, understanding finance options and an overview of the process and issues that drive a dam removal project, and key issues to consider in design and construction.

the future.

In the coming year we aim to work with partners to develop this toolkit into a more comprehensive guide and training for practitioners. In the interim, we would be honored to have your input on helpful scope and content, to ensure the resource supports your needs. Please contact us here.

Terminology

Barriers on rivers, include dams, weirs, road and railroad crossings, levees and more, that fragment our rivers, impacting both up and downstream flow as well as the connection to the floodplain. For this toolkit we focus on dams and weirs. We will use the term "dam" inclusively to refer to barriers that span the stream channel for the purposes of impounding or diverting water, block the natural movement of water, fish, sediment and nutrients in the river. Dams can be made of any combination of concrete, stone, brick or earth, and may have been built for many different purposes such as hydropower, water supply, or recreation.

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2. Why Remove Dams?



ON THE PENOBSCOT An unprecedented array of partners, including the Nature Conservancy and the Penobscot Indian Nation, have come together to accomplish the goal of restoring the Penobscot River. © Bridget Besaw

While the exact number is not yet known, it is estimated that there are more than 1 million stream barriers in Europe. Many still serve vital functions, like water supply, and flood risk reduction. However, it is estimated that tens of thousands are no longer in use, nearing the end of their design life, and in need of review to assess whether decommissioning and removal is an economically and environmentally effective path forward.

Over the past 25 years, led by countries including France, Spain, Sweden, Finland, Estonia and the United Kingdom, preliminary findings show that more than 4,500 dam, weir and barrier removals have been implemented in Europe.

Common reasons for pursuing barrier removal in Europe have included one or a bination of the following:

- Public safety concerns due to risk of failure during flood events
- Reduced capacity and function due to sedimentation
- Restore migratory fish pathways
- Restore ecological functions and ecosystem services
- Restore habitat for endangered fish and wildlife

Ecological and Socio-economic Benefits

Dams have a wide range of impacts on the environment and local communities, including loss of biodiversity, blocking fish migrations, trapping sediment and nutrients that maintain habitat and estuary health, and altering flow patterns that drive the productivity of downstream floodplains and wetlands.

The selective removal of dams can restore the natural flows and conditions of rivers, as well as the societal and economic benefits that rivers provide. Increasingly, dam owners and communities see dam removal as a long-term option and are enjoying the benefits of a free-flowing river.

ECOLOGICAL BENEFITS

While the specific ecological response to a dam removal project will be different for each river and watershed, there are general observations and conclusions that have been made from synthesizing the body of research published to date that provide a helpful foundation for predicting responses for future projects.

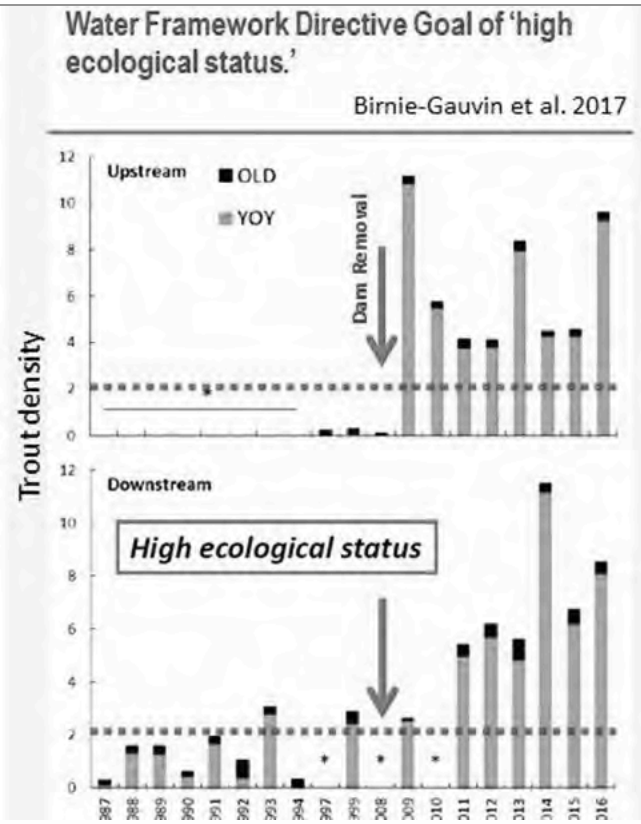
ntly, the Dam Removal Synthesis Working Group, a consortium of 22 scientists from . government, academic and NGO organizations, summarized existing monitoring data

This collection of studies has found:

- **Rivers respond quickly**. Physical responses to dam removals are typically fast, with the rate of sediment movement from the site largely dependent on sediment characteristics and dam removal strategy. Functional connectivity is also quickly restored, sometimes immediately, between upstream and downstream river reaches, including the movement of material and organisms.
- **Watershed-scale benefits and climate resilience.** Dam removal is one of the few reach-specific restoration practices that has demonstrated the potential for providing watershed-scale restoration and enhancing watershed resilience in the face of human-caused changes to the landscape and climate.
- **Restoration of river processes and functions.** Removals improved nutrient and sediment transport and substrate distribution. After a dam removal, stream functions may be fully restored in less than 10 years and frequently in less than five. Compared to other stream restoration techniques, dam removals restore self-sustaining processes, requiring minimal maintenance and delivering more sustainable environmental outcomes.
- **Species and population recovery.** Dam removal projects have consistently restored up and downstream passage for resident and migratory fish, including sea-run fish. Where sea-run fish populations have recovered, marine fisheries, have benefited. Monitoring reveals improvement to the quantity, age distribution and diversity of stream-dependent fish species, increased quantity and distribution of freshwater mussels and stream-dependent invertebrates and improved mammal and bird habitat.
- **Water quality improvements.** Improvements to water quality, especially ambient temperature, dissolved oxygen and nutrients.

in habitat type (from lake to stream), release of sediment from behind the impoundment and allowing non-native species to gain access to areas from which they were previously excluded by the barrier. These potential risks should be thoroughly assessed before implementing a project. Quantitative modeling capability is improving, particularly for physical and broad-scale ecological effects, giving managers predictive tools for more informed and precise decision making. Ecological responses differ upstream, downstream and within the inundation zone and there are empirical observations to help with predictions in each of these impact areas.

In summary, barrier removal projects, when properly sited and carefully managed, can be highly durable ecosystem restoration actions that permanently increase habitat connectivity and improve processes and functions important for the health of connected freshwater and estuary habitats.



- Kernan Dam, Léguer River, France
- Kentchurch Weir, River Monnow, Wales
- Maisons-rouges Dam, Vienne River, France
- Vilholt Dam, Gudenaa River, Denmark
- Yecla de Yeltes Dam, Huebra River, Spain
- Pärnu watershed restoration, Estonia

Read more about these case studies and others through Dam Removal Europe: https://damremoval.eu



SOCIAL AND ECONOMIC BENEFITS

The benefits of a project will vary, in general they will be a factor of the position of the dam within the watershed, relative to other resources and threats, the condition of the dam, the complexity of the project and its management. Several examples of social and economic benefits are described below.

- **Public safety and climate adaptation:** Dams that have been abandoned or are unmaintained can pose a risk of failure, especially during flood events. Low head dams can also pose a significant hazard for boaters and swimmers. These risks can have resulted in property loss, injury and in some cases, loss of life. With a changing climate and an increase in extreme weather events, dam removal has been seen as a

the long-term costs of operation, repair and maintenance, dam removal can even be the most economical option. A recent US study found that removal could be 10 to 30 times cheaper than ongoing maintenance and repair.

- **Cultural values:** Local communities and native people can have long-standing cultural and spiritual ties connected to individual free-flowing rivers, their features and the species that they support. Restoration through dam removal can provide significant, and in some cases irreplaceable, benefits in restoring these resources and connections to communities. Examples of dam removals that had a significant cultural benefit include, Glines Canyon Dam, Elwha River, Oregon; Veazie and Great Works Dams, Penobscot River Restoration Project, Maine.
- **Transition to lower cost, lower impact renewable electricity:**Older hydroelectric dams were often sited and constructed to support a specific mill or factory. Many of these mills and factories have since closed, and the capacity of the stranded energy to the electricity grid may be more effectively supplied by a lower cost, lower impact renewable energy source like wind or solar. Overall, with the significant drops in the cost of deploying wind, solar and battery technologies, a global study by TNC and WWF highlights the shifting role of hydroelectricity in meeting our clean energy needs, citing the global technical potential of low-impact wind and solar is 17 times the renewable energy targets under the Paris Climate Agreement.

> *To restore and protect the Elwha River for current and future generations, economists found that the public would be willing to pay $4.8B euros.*

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to remove the dams and restore the river. Several similarly designed studies have documented the substantial value that people place on the following environmental changes associated with removing dams:

- The existence of a free-flowing river that individuals can see now, in the future, or for future generations
- Knowledge that endangered species are present in a river and their population is recovering
- Improved catch rates for recreational anglers
- Improved experiences for whitewater boaters



FLY FISHING ON THE SAVINJA Barrier removal projects can help increase the catch rate for recreational anglers, like this one on the Savinja River in Slovenia. © Creative Commons

- **Recreational angling and commercial fisheries:** For projects that improve habitat for valued recreational or commercial fish, like trout, salmon, river herring, etc., measurable economic benefits have included improved catch rates, improved experiences, increase in jobs and revenue (increased visiting anglers). Two examples:

    - The Sea Trout Funen Project in Denmark generates an estimated $5.8 M EUR/year in angling tourism for a $.5M EUR/year initial investment in river restoration through dam removal.
    - In the State of Maine, USA, the restoration of rivers has resulted in fish harvesting permit sales to towns exceeding $600,000 EUR/year (Maine

most important fishery is another searun fish, the juvenile (elver) American eel (>$18M EUR in 2019: Maine DMR).

- **River recreation and other tourism:** Returning rivers to a free-flowing state can support new canoeing, boating and whitewater rafting opportunities. An increase in boaters can benefit neighboring communities when visitors support guide companies, restaurants, lodging and other establishments. For example, after the restoration of the lower Penobscot River the city of Bangor hosted the North America Whitewater Regatta for the first time and remained the host for three years in a row, bringing significant tourism and related revenues to the region.
- **Restoration economy – job creation:** Dam removal projects are infrastructure projects, and as such require the labor and services of engineering and construction professionals. This value has rarely been quantified but two examples from the United States demonstrate the tangible economic benefit and justification for further concentrated research.

    - In the state of Massachusetts, for every $900K EUR spent on restoration projects, 10 to 13 jobs were created or maintained
    - In the state of Oregon, 15 to 23 new jobs were created for every for every $900K EUR spent on watershed restoration, this also resulted in and $1.9-2.0M EUR in economic activity

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3. Project Phases



CUDDEBACKVILLE DAM Photo of the dam prior to its 2004 demolition on the Neversink River at Cuddebackville, New York. © Mark Godfrey/TNC

With so many dams and possible projects on rivers, how to start can feel like a challenge. There are a series of tasks that must be accomplished to take a project from an idea through design and ultimately construction for restoration. While each project is unique, generally, most projects require similar phases and considerations as outlined below and then further described in the following sections.

Project Planning and Assessment	Design and Permitting	Construction
Project identification. Partner development. Define project goals. Scope feasibility.	Field surveys and studies. Engineering design. Permitting review iterative with the design.	Hiring and working with a construction contractor. Determine partner roles.
Cross-cutting: Monitoring and Communication		
Determine best methods for outreach and communication with the community and partners. Develop pre and post restoration monitoring goals iterative with the project goals, designs, and permitting.		

Project Planning and Assessment

DEFINING PROJECT GOALS, PRIORITIZATION CONSIDERATIONS

ermine goals for all project partners at the beginning of a project. Fish passage, healthy er quality, improved safety, and reduced maintenance may all be part of the suite of

project will improve river habitat to different degrees depending on the scale of the impact. Where we work and how we spend limit resource dollars increasingly calls for us to be strategic when choosing which projects to move forward.

Many governments and nonprofits now have decision-support or prioritization tools available to estimate the relative benefits of a potential project. Common prioritization metrics for ecological restoration include projects that connect a high number of river miles in areas with good habitat and projects that will that will improve water quality.

Often these decision-support or prioritization tools are developed at a watershed or basin scale. By working at a watershed scale, agencies and partners can identify multiple projects that may advance established goals to restore rare or important riverine species.

In these cases, possibly several removals together will create a large network and could have a greater impact that one project alone or projects across multiple watersheds.

Please see the Resources section for example approaches to barrier prioritization and watershed scale restoration.

DEVELOPING A TEAM. WHO DOES WHAT WORK?

Developing a strong project team can be very helpful for some projects, particularly when managing more complex issues and multiple objectives. Even so it is good to determine who is the central project manager and how partners are each contributing.

If agency personnel are able, it can be beneficial to have them on the partner team to help access with data collection or assist with early review of designs and the permitting process. This does not need to be a formal or written structure, but questions to consider include:

- What is the role of agencies and NGO partners?

4. Who will be responsible for fundraising?

Different project phases will require different expertise, including biologists for survey, environmental and structural engineering firms for design, historic specialists, and permit specialists. The project team members may be able to complete some of these tasks.

For instance, state biologists may already have species information or are able to do the necessary biological inventory. Similarly, someone on the team may have experience with completing and submitting permits.

Project considerations

OWNERSHIP

Permission to remove a dam is a critical early step. Dams may be owned by the government, businesses, nonprofit organizations or individuals. Determine who owns the dam and what their long-term interests are in the dam and the associated uses of the impoundment.

Dam owners often have concerns and need design answers before they are able to decide. In such a case it is not uncommon to do a certain level of research or limited analysis to help answer some of these questions or agree that the design will meet a certain set of criteria.

For instance, that a drinking water intake that relies on the depth of the impoundment will be replaced with an alternative. When actively developing designs for a project, it is important to have agreement with the dam owner for removal and restoration before investing a lot time and resources.

SITE ASSESSMENT

Issues to look for include size of the dam, width of the impoundment relative to the river, existing uses (hydropower, water supply, recreation, etc.), adjacent infrastructure (roads, bridges, walls), upstream land use, sediment, visible bedrock, and more.

A sample site assessment to understand the potential complexity of a project is also included under the Resources section.

EXISTING USE

Every dam removal will change the area upstream and to varying extents the area downstream of the dam. Determining the existing uses of the dam and the impoundment are important to understand what uses may be affected and how that will impact the design.

In many cases, the existing uses will not all go away or can be mitigated for in the design. For instance, a pond that is used for fire suppression could be replaced by an in-river hydrant. In a well-known case in the United States, active hydroelectric dams were removed on the mainstem Penobscot River in exchange for the ability to install increased power capacity at dams on a tributary.

Local connections to the dam or impoundment go beyond commercial uses. Members of the community may feel a strong emotional connection tied to existing uses for recreation, scenery, or history. This fear of change can be a difficult hurdle to overcome and we discuss it further below when assessing key issues in your design and the importance of pro-active and consistent communication throughout the project phases.

Key issues to consider in assessing project scope and feasibility and defining project stakeholders

The top issues that are most likely to drive the complexity of a project are existing infrastructure, sediment quantity and quality, and ecological sensitivity, so we touch on those first. Case studies that illustrate complex and straightforward projects are included in the Case Studies section.

INFRASTRUCTURE/UTILITIES

It is critical to the design and construction of any dam removal to avoid impacts to human health and safety. Identify any infrastructure adjacent to, or within the limits of impact of your project early in the project.

This includes bridges upstream and downstream of the dam, roads or walls along the river, and water or sewer pipes under the stream bed or in the adjacent river bank. Not all infrastructure will be affected by the removal, but you want to determine this in advance and plan for it.

Often bridges or pipes were installed without considering that the dam and impoundment may not always be in place. Rivers are dynamic and can shift course from floods. In some cases, relocating a water pipe will be the best long-term solution. Adding scour protection to an existing bridge may be enough to protect from changes that might otherwise undermine a bridge pier or abutment.

SEDIMENT QUANTITY AND QUALITY

Sediment type, quality, and quantity play a large role in project design. In recent years, resource agencies and the dam removal community have come to better recognize that rivers naturally move sediment and nutrients every day, and even more so during high flow ts. Sediment is a natural component of the system.



K NAI, conservationists gather mud in sieves and rinse away the sediment to collect wildlife such as worms, shrimp and crabs. The creatures are taken to HKU's scientific laboratories © Lori CHeung/TNC

Sediment that is contaminated with high levels of pollutants that can impact human health may need to be removed and relocated to an approved off-site location.

It is important to note that not all dams accumulate sediment, not all sediment in the impoundment will move, and even then, not all at once. As a general rule a wide impoundment with a small stream will have less sediment erosion than a narrow impoundment.

Sediment, particularly sand and gravel, can be beneficial for rebuilding downstream gravel beds and creating habitat, as well as rebuilding estuary habitats and salt marshes farther downstream. Therefore, some projects allow for a natural release of sediment that will gradually move downstream and ultimately be replenished from upstream through restored river function after the dam is removed.

The Ennerdale Weir and the Retuerta Dam removals illustrate two different approaches to managing sediment benefits and impacts. See also the Additional Resources section for links to an example of published sediment guidelines from the US Bureau of Reclamation.

ECOLOGICAL SENSITIVITY

Dam removal will fundamentally change the habitat type and construction activities inherently have some impacts. The fish, wildlife, and plants that are in the impoundment will be impacted as the dam is removed and the water recedes.

It is important to recognize this and know that there will likely be a loss of plants and animals with low mobility (like mussels). You cannot avoid all impacts to all individuals or species, but there are best practices that can be implemented to minimize these impacts.

Work with your natural resource agencies to determine particular species that are threatened or endangered which could be impacted in the short or long term. In other

minimize those impacts.

Planning for species impacts could include adjusting the time of year construction takes place, implementing certain measures during construction to avoid impacting the species, or adding habitat features to the design to benefit critical species. Some examples are below.

Construction timing: Avoiding impacts

- Biologists may want to avoid construction during the migratory season for fish. Thus, the construction can be timed to start after migration.
- Avoid nesting and spawning season for a particular species, or have a biologist identify specific sites to be avoided or protected during construction.

Pre-construction methods: Minimizing impacts

- Biologists may be able to collect and relocate individuals from the impoundment before construction starts. For example: electro-shocking fish or hand collection of mussels during a controlled draw down of the water level.
- Installing barriers to prevent species from moving into the construction site. For example, a barrier can be put in place around the site to prevent wildlife, like turtles, from entering the construction zone and being injured by moving equipment.

Improving Habitat: Mitigation for impacts

- Native plants can be added to kick start a restoration, such as trees to add shade to reduce water temperature
- Habitat features could be added for sensitive species that may be impacted. An example of this could include keeping trees removed during construction on site an...

In the Ennerdale Weir removal case study, protected fresh-water mussels were both a target species that benefit from the removal, as well as a sensitive species requiring special sediment management measures during construction.



ED BILLS POND DAM REMOVAL, USA Volunteers work to plant the former impounded area following a dam removal on the Eight Mile River. © TNC

additional public outreach to prepare people for the change and provide examples from other projects.

Public outreach can be supported by developing design schematics, photo simulations, or illustrations of the site before and after removal. Examples from other dam removal and restoration sites are also useful. These types of public sites may also warrant consideration for additional planting to kick start some of the natural regrowth.

The impact on steeper gradient streams with narrower impoundments will likely be less visually dramatic and therefore less challenging for the public.

RECREATION AND COMMUNITY ACCESS

As the river changes, types of recreation can change. Talk with the community about what concerns they have. Sometimes a drained impoundment can have walking paths built or benches and interpretive signs added at overlooks. Fishing access or new boating access can also help people enjoy the new river. In some cases, dam removal creates new white-water recreation opportunities.



FREE-FLOWING KENNEBEC Paddlers enjoy a stretch of the Kennebec River that has been free-flowing since removal of the Edwards Dam. © Tim Paul / TNC

HISTORIC

Many dams were built decades to hundreds of years ago and may have significant cultural and historic significance. Removing a dam could have an impact on these values. Identify the local and country laws around these impacts. In many cases the impact cannot be avoided, if the dam itself is the critical feature. Photo documentation of the dam before and during removal can provide insight into the architectural and engineering history of the dam. Interpretive signs can serve as a marker and educate the public of the past significance of the site after the project is complete.

FLOODING AND FLOOD CONTROL

ple often have concerns about how dam removal will affect flooding. This stems in part from the perception that all dams provide flood control, when in fact very few actually do.

your communication with the dam owner and the public.

Design and Permitting

Once you have selected a project and understand the key issues, you will need to develop design plans to complete the restoration. The complexity of the project will determine what types of engineering and biological studies are necessary and how detailed the plans need to be.

Sustainable Restoration Project Design

Design should address the previously discussed issues through the project planning and site assessment, as well as those identified by the owner, partners and agencies. Keep in mind that not all projects need to design for, or consider, all issues.

Restoration projects should be designed to meet ecological goals and match the situational context, while maintaining health and safety of the community. Consider the following three keys when approaching your project design.

1. **Simple vs. Complex projects.** Projects will need a different level of design and analysis depending on the issues at the site and the surrounding context. For instance, a project in the middle of a city with adjacent water pipes and a high volume of potentially contaminated sediment will require greater study and likely a more complex design than a project on a bedrock dominated stream in a natural area.
2. **Removal for restoration.** In order to restore river function and processes any dam removal should always remove the full vertical extentof the dam and as much of the

and the scour the riverbed as well as limit fish passage.

3. **Passive vs. Active Restoration.** Given the dynamic nature of rivers, less is often more when it comes to river restoration. Understand the project goals and determine how best to meet those through the design process. Passive restoration recognizes that the site will adjust over time and minimizes in-channel work, focusing on full removalof the dam and allowing for the river to self-adjust. Active restoration may be more appropriate in a case where infrastructure and sediment management require some direct channel reconstruction, or installation of infrastructure protection measures.

HIRING THE RIGHT EXPERTISE

Many projects will require design by a certified engineer. Often this will include someone or a firm with experience that includes hydrologists and structural engineers. You'll want to find someone with experience working in river systems.

Dam removal is a relatively new field, so not all engineers may have designed a removal, but identify engineers with experience in rivers, including dam building or bridge design. Both types of projects that require similar types of analysis involved with dam removal.

Also consider including a fluvial geomorphologist on your team, a scientist who understands how flow and velocities influences river structure and habitat. Especially if others on your team don't have prior experience working on river restoration projects, it is important to have someone with expertise in river form and function reviewing the design.

BASIC COMPONENTS OF A PROJECT DESIGN

design and summarizes the analysis that went into the design. The memo can also be used to layout alternatives analysis if that was part of the process.

Design sheets: The detail of your engineering design will depend on the complexity of your project and your permitting requirements. In general project plans will lay out a site base map with existing conditions and natural resource areas, equipment access, the sequence of removal construction, extent of natural resources impacted, and proposed final conditions. Design plans typically present a profile view of the stream channel as well as existing and proposed cross-sections of the river channel. You may also need to provide detailed information on particular activities such as how you will manage dewatering, sediment management, or restoration plantings.

Cost Estimate: Once you have a design, you'll be able to determine estimate. Working with an engineer they are able to estimate costs before you look for a construction firm to complete the work.

PERMITS

Contact your regulatory agencies to determine what permits the project will require, including the timelines and agency personnel contacts for each permit. Typical permits can be from separate local and state authorities and may relate to potential impacts to wetlands or stream, species specific impacts, dam specific issues, or building and demolition issues.

Rather than wait until the design is complete, it is often useful to initiate project discussions with the permitting agencies early in the design process so that designs may be adjusted to best avoid impacts and account for resource concerns. This iterative process can save time and money and often delivers a better restoration result.



CUDDEBACKVILLE DAM, NEW YORK Start of breach during demolition of the Cuddebackville dam on the Neversink River at Cuddebackville, New York in September, 2004. © George Schuler/TNC

CONSTRUCTION APPROACHES

How you approach construction will be somewhat determined by design issues such as your sediment management plan and avoiding sensitive species impacts, and site issues, such as if you are able to draw down the water levels in the impoundment in advance.

river around the construction site. Building and maintaining water diversion will extend the construction time and increase costs, but there are often reasons that this is right approach, for instance when building in the river.

In the case of in-river work, it is allowable for the equipment be in the river up to a certain safe depth, usually with a requirement for biodegradable hydraulic fluid. This works better in cobble and bedrock streams where there is less risk of heavy equipment sinking into soft sediment.

WORKING WITH A CONTRACTOR

Determine how to move forward with construction and bring in the right expertise to fit the project. More complex projects may require hiring a construction firm with significant structural building experience.

Regardless of the complexity of the project, look for firms with experience working in water, particularly in rivers. These types of firms will know how to watch and manage for rain events and will have operators comfortable working in wet environments. Many of these firms are also often able to suggest construction approaches that save time and money.

Determine who from your team, partners or the engineering design firm will be on site to help direct the contractor. You should consider having the design engineer on site for phases that include technical issues such as complex water management or building infrastructure protection measures or a rock riffle. Having the design engineer on site also ensures they are liable for their designs if they oversee installation.



ROB BULLARD AT DAM REMOVAL Rob Bullard, Tennessee River and Cumberland River Program Director for The Nature Conservancy in Tennessee, was on the scene as the Roaring River Dam was being removed. © Cory Holliday/The Nature Conservancy



ROARING RIVER DAM DIGGING OUT A power shovel tears away the old deteriorating dam on Tennessee's Roaring River. © Paul Kingsbury/The Nature Conservancy

SAFETY

Always develop and follow a safety plan both for the safety of the contractors and for the partners and visitors to the site. Common elements include restricting public access with posted signs, wearing safety vests and hard hats, requiring visitors to check in when arriving on site, and posting proper signs to direct traffic.

CROSS-CUTTING

MONITORING

We learn from our successes and our challenges with each project and the right monitoring contributes to our understanding of river restoration techniques. Partners should determine what metrics should be monitored as not all projects necessarily warrant the same level of monitoring.

Often funders require monitoring of one or two factors to ensure the project met the funding goal. For instance, evidence that migratory fish are using the site and continuing upstream following restoration, or improvements in water quality and temperature.

In other cases, partners have reason to complete a longer and more comprehensive study to include physical and biological metrics such as plant communities, fish and wildlife presence, substrate type, water quality, and more. For most projects, you'll want to determine an appropriate time span, including sufficient pre and post restoration data collection.

Examples of monitoring protocols are included in the Resources section below.

FUNDING

Funding is always a big question with any project. Based on your project goals and the types of benefits you may be eligible for different types of funding.

Determine what species will benefit from your restoration, including metrics like how many miles of habitat will be accessible. Projects that benefit migratory species are often easier to fund, but funding is available for native species as well.

Also look into infrastructure funding, considering that removing aging infrastructure ha a ic safety benefit and reduces future maintenance costs. When developing a budget for

COMMUNICATION AND STAKEHOLDER ENGAGEMENT

Clear, proactive, and consistent communication with the stakeholders interested in the current and future condition of the river may be necessary across all phases of a project from planning through construction and post-construction monitoring.

Depending on the complexity of the project, this may include a combination of announcements in local newspapers, community forums or social media, public meetings and an accountable and accessible point of contact for stakeholders to reach with any questions or concerns.

Some smaller projects with fewer noticeable changes may not require the same intensity of outreach. Communicate the anticipated benefits of the project, any anticipated negative impacts, and a plan to manage those impacts. Often, an illustration of the site before and after construction, can help with communication.

BACK TO TOP

4. Overview of Financing Options



WATERFALLS OF THE UNA RIVER The Štrbački buk waterfalls and the the Una River forms a natural border between Croatia and Bosnia-Herzegovina. © Ken Geiger/TNC

Ideally, when a dam is no longer serving its intended purpose, or when its value is outweighed by the social or environmental costs, the owner would be responsible for, and able to, finance removal of their infrastructure.

Today, for many reasons, this is rarely the case. Over decades, and in some cases centuries, dams can change owners multiple times, or they can be abandoned altogether. In addition, historically, the life-cycle costs of a dam, including the cost of removing infrastructure, has not been factored into the business model.

Many local and national governments, including many countries in Europe and in the U.S., lack proper regulatory frameworks and funding mechanisms to address the public safety issues associated with maintenance and removal of unsafe dams.

Existing Funding Mechanisms

By understanding the many potential benefits the project may provide – for people and nature – in addition to your specific objectives, you can maximize the potential for community and financial support.

These benefits may include climate adaptation and public safety, water quality, recreation, water supply, biodiversity, migratory fish and the environment. In general, sources can be separated into public and private funding.

One source of funding may be adequate to finance a small, low-controversy project – while large, and more complex projects may require two or more sources of funding.

Public funding sources used in European countries include:

EUROPEAN UNION

- The Cohesion Fund: This fund allocates € 63.4 billion to trans-European transportation and environmental projects, aiming to reduce economic and social disparity and promote sustainable development. In candidate countries it has been used to support dozens of dam removal projects. Notably, the Estonian Government successfully leveraged use of the Cohesion Fund to finance 85% of a €15 M basin-scale restoration project in the Parnü River Basin including eight dam removals on the mainstem and tributaries. The remaining 15% was provided by the Estonian state budget. Key to using this fund was the development of a River Basin Management Plan that identifies the needs and priorities for dam removal consistent with implementation of the Water Framework Directive.

European Commission LIFE Environment subprogram. The goal of the environment subprogram is to fund nature conservation projects with a focus on the areas of biodiversity, habitats and species, so long as more than half of the project costs are used to improve conservation status of priority habitats or species listed in the EU's birds and habitats directives. Otherwise, general nature conservation projects may receive co-financing of up to 60%. *Example: Yecla de Yeltes Dam, Huebra River, Spain incudes a Natura 2000 site and was therefore eligible for LIFE funding.*

LOCAL AND NATIONAL GOVERNMENTS

- Municipalities and Water Authorities may have the resources and jurisdiction to purchase and remove obsolete dams. *Example: In Sweden, Hudiksvall Municipality, purchased and removed Sofieholm's hydroelectric power station. In France, water authorities may subsidize a portion of removal costs.*
- Project funding has been provided through national agencies including national park authorities, environmental agencies, and marine and fisheries management agencies in countries including France, U.K., Estonia, Sweden, Switzerland, Spain, Finland and Germany have funded projects. For example, in 2019, the Finnish Government announced they would allocate $18M EUR to increase funding for restoring migratory fish through barrier removal and restoration of breeding grounds.

Private funding opportunities may include:

FOUNDATIONS AND PRIVATE DONORS

- Removing an obstacle from a river and returning it to its free-flowing state is something that can be seen as a direct legacy for donors. The one-time investment

- Europe is a global leader on funding barrier removal through crowdsourcing. Led by the efforts of WWF Netherlands, they have facilitated raising tens of thousands of EURs to date, removing barriers in the Ukraine and the U.K., with more in the cue. Learn more about their Dam Removal Funding Platform here.

NON-GOVERNMENTAL ORGANIZATIONS

- Local, national and global environmental and river conservation organizations
- Angler's associations (Association of Anglers for the Conservation of Rivers, European Anglers Alliance). On the River Dove in England, local fishing clubs helped to fund and manage dozens of weir removal projects.
- Whitewater and paddling associations



KRUPA RIVER, CROATIA The winding Krupa River makes its way through Croatia. © TNC/Chip Carroon

funding streams.

1. LIFE-CYCLE FINANCE MODELS

With a better understanding of the full life cycle cost of dams, lenders and governments can make project financing and permitting contingent on a commitment to incorporate the true cost of the project, from cradle to grave, into the business model.

This would include the project owner guaranteeing financial reserves for the removal. In a setting where the cumulative social and environmental impacts of existing dams is already high, these reserves may be used to establish a revolving fund where the cost of removal of the newly financed or permitted project is used in the near-term to remove existing high priority dams that no longer serve their intended purpose.

2. CLIMATE ADAPTATION AND PUBLIC SAFETY

As our climate changes, flood and drought events will continue to become more extreme. Strategic barrier removal can be incorporated into local and national climate adaptation strategies to reduce the community risks of failure during a flood event or exacerbating critical water quality conditions during dry seasons or drought events.

This is also a measure to support adaptation of ecosystems by increasing river connectivity and resilience. In Massachusetts, there are several state-level programs that can serve as models for how to include dam removal finance in a public safety and climate resilience strategy.

Three examples include:



- Municipal Vulnerability Preparedness (MVP) Program Action Grants. TNC worked with the state to develop a vulnerability and climate adaptation rapid planning process for municipalities. After completing a MVP plan, municipalities are eligible to apply for Action Grants to implement their plans. Ecological restoration, including dam removal, is an eligible activity.
- State Hazard Mitigation and Climate Adaptation Plan (SHMCAP). Using a collaborative stakeholder process, Massachusetts recently released a statewide climate adaptation plan to promote resilience of state agency operations, assets and resources. Dam removal is a key adaptation tool referenced in the newly released plan and draft legislation is being proposed to fund implementation.

3. ENVIRONMENTAL MARKETS FOR DAM REMOVAL

An environmental market is an exchange-based approach that uses market mechanisms to achieve environmental goals (regulatory and non-regulatory). Below, we outline two types of environmental markets emerging for dam removal; compensatory mitigation and ecosystem service markets.

Compensatory mitigation. The first is based on the opportunity to use dam removal as a mitigation tool for unavoidable environmental impacts as required by regional or national environmental regulations. For example, in 2018 the Sihlpost Dam was removed in Sweden as mitigation to offset river impacts from a railway expansion.

A recent Nature Conservancy study highlights example crediting mechanisms for dam removal and offers recommendations to increase the use of dam removal as a mitigation tool in the U.S.

Water Act.

In Europe, environmental regulations and mitigation requirements vary from country to country, however three general regulatory frameworks may readily support markets for barrier removal:

- *Biodiversity offsets*—where new development is negatively impacting river habitat, and offsets are required, dam removal can be a durable river restoration tool to create habitat for critical species and populations – in particular, for migratory and resident fish, freshwater mussels and other macroinvertebrates and, potentially for riverine-dependent plants, birds and mammals. Regulatory frameworks that may support biodiversity markets include Natura 2000, European Commission Eel Regulation and National Eel Management Plans, and country-or regional fish passage regulations.
- *Concessions/permits for water use or hydropower*—where regulatory requirements are in place and enforced, strategic dam removal can be a mitigation tool for renewing existing hydropower and/or water use concessions or potentially for considering new ones.
- *Water Framework Directive*—several dam removal projects have demonstrated the ability to improve ecological status to meet the goals of the water framework directive. Similar to biodiversity offsets, where existing or new developments are seeking opportunities to mitigate their impacts to a stream's condition and status under the Water Framework Directive, dam removal may be used as a mitigation tool (see benefits).

In the U.S., formalized environmental mitigation markets have been demonstrated to reduce permitting times by half, can make more effective conservation investments

Targeted ecosystem service restoration.

A second type of market may be created by the restoration of a specific ecosystem service. Simply put, a service provider pays for the dam removal to improve the provision of its services.

For example, dam removals have been demonstrated to improve water chemistry (DO, temperature) and reduce the risk of algal blooms. A water utility may pay for the removal of an obsolete dam upstream of its intake, in order to improve source water quality and reduce treatment costs.

Dam removals have also been demonstrated to drastically improved recreation and fishing opportunities. In these cases, an angler's association group may pay to remove a dam in exchange for the benefit of the fisheries or in exchange for an extension of the region for which it manages permitting authority.

4. LEVERAGING ECONOMIES OF SCALE

Governments, NGOs and private investors have found ways to drastically reduce the project costs of dam removal by both, vertically integrating project phases and by implementing multiple projects at the same time.

For example, there is a federal team in the U.S. Fish and Wildlife Service that is trained in the design, permitting, project management and construction of dam removal projects. This team specialization has dramatically reduced the overall cost of project implementation and could potentially be replicated by a government agency or NGO in Europe.

Similarly, government agencies and NGOs that are moving forward with several dam ovals at the same time may issue a request for proposal on a comprehensive service

5. Case Studies

The following case studies present in brief three dam removal projects which illustrate success managing some of the key issues at restoration projects.



Retuerta Dam, Spain

Removal of the Retuerta Dam is restoring fisheries and natural river processes in the Aravelle River in the municipality of Umbrías, Spain. **Read the case study.**



Ennerdale Mill Weir

The Ennerdale Mill Weir removal is an example of a successful project that was accomplished with limited complexities. **Read the case study.**



Vezins Dam Removal

6. Resources



UNA RIVER, BOSNIA The Una River flowing through Bosnia. The river forms a natural border between Croatia and Bosnia-Herzegovina. © Ken Geiger/TNC

Ecological and Socioeconomic Benefits of Dam Removal +

Regional Barrier Prioritization Tools, Project Databases and Studies +

Authors and contributors

Content written and edited by Tara Moberg and Amy Singler with thanks to our partners at Dam Removal Europe, Rewilding Europe, WWF Netherlands, and the Massachusetts Division of Ecological Restoration for sharing their experience, review and contributions to the case studies and financing sections.

Questions, comments or suggestions on the above content can be emailed to Tara Moberg at tmoberg@tnc.org.

Acknowledgements

The Nature Conservancy is fortunate to have the support of visionary people and organizations, whose generosity allows us to pursue our mission. We are grateful to the Enterprise Rent-A-Car Foundation for supporting our work to find water solutions that work for rivers and the communities that depend on them.

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Attachment 3
Source: https://www.nyclimateexchange.org/blog/project-closed-circuit-helping-cities-lead-on-ev-battery-circularity

Project Closed Circuit: Helping Cities Lead on EV Battery Circularity

Apr 10

The New York Climate Exchange recently launched ***Project Closed Circuit***, a new project to put cities at the center of electric vehicle (EV) battery circularity.

What is EV Battery Circularity?

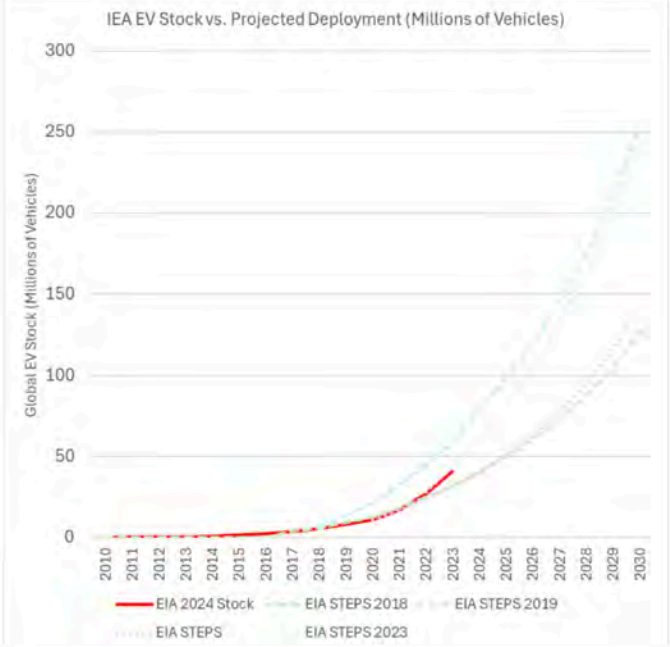


Figure: Global EV Stock vs. forecasted demand (2018-2023 forecasts, 2024 actual)

Batteries are at the heart of the effort to electrify the economy and move away from fossil fuels. From powering EVs to storing electricity generated by wind and solar, global battery demand has surged by around 33% per year over the past 30 years. Nearly 95% of recent growth is driven by EVs. In 2013, there were only 100,000 electric vehicles on the road worldwide; just 10 years later that number reached 40 million!

The transition to EVs comes with challenges.

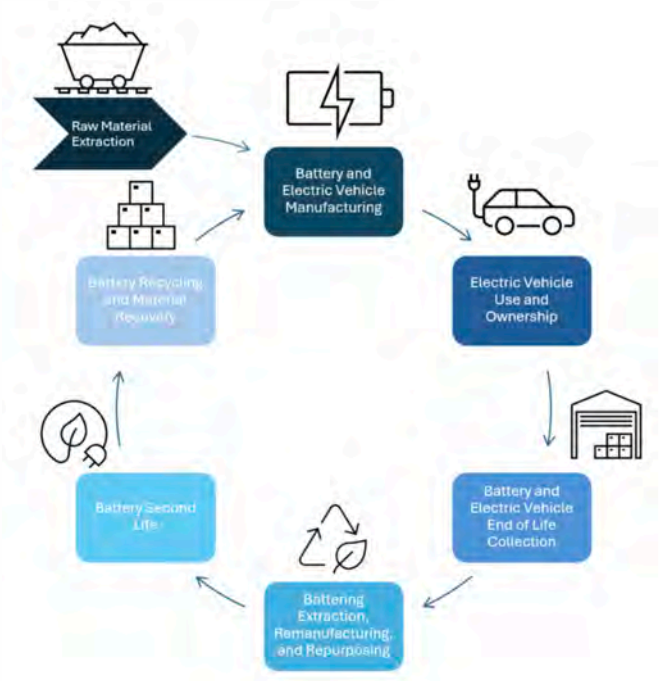
[International Energy Agency, Annual Energy Outlooks 2018-2024]

All batteries require rare earth materials—85% of the world's lithium, 70% of its cobalt, and 10% of its nickel go to battery production—and we'll need hundreds of new mines to meet growing demand. Many of these mines come with environmental and human rights concerns and increase the world's dependence on unstable supply zones.

Still, EVs are much less harmful to the environment than gas-powered vehicles, however high upfront costs and questions about battery life contributes to slow adoption. Like cell phones, EV batteries degrade over time. Around 7-12 years into an EV battery's life, it loses about 25% of its original strength. At this stage, the battery may struggle to maintain peak performance, despite having 70-80% of its charging capacity.

Disposing these batteries in landfills risks contamination from toxic materials and recycling them prematurely wastes their remaining value. **A single-use EV battery is unsustainable.** Without a better way recycle and repurpose batteries, the growing EV market could turn a climate solution into an environmental crisis.

A "circular" approach offers a sustainable solution and massive market opportunity.



A circular strategy maximizes a vehicle's lifecycle using intelligent battery management. This first stage involves using data to optimize battery performance so it can be used longer before being discarded.

Once a battery's charging capacity degrades to 70-80%, it can be reused or repurposed. These second-life batteries can be used in building energy systems or electrical grid storage. This approach transforms a battery, once considered garbage, into a valuable asset, and allows EV owners to earn money from their used batteries. These circular

Figure: A Circular Economy for EV Batteries. Credit: Wyatt Williams

economy principles make EV ownership more affordable and environmentally responsible.

Finally, at the end of its life, the battery can be recycled. Recycling processes extract and purify raw materials and send them back to manufacturers for new batteries. This closed-loop approach dramatically reduces the need to mine new materials, creating a sustainable cycle that minimizes waste and environmental impact.

Current estimates value the battery circularity market to be $7 billion by 2033. According to The International Energy Agency, battery circularity could decrease the need for critical mineral mining by up to 40% and decrease greenhouse gas emissions by up to 80%. EV batteries that are suitable for second-life applications could create more than 200 GWh of power—enough energy to power around 18,500 American homes for a year—by 2030 Plus, local circular economies for batteries reduce dependence on foreign sources of raw materials

Cities are already at the forefront of the battery revolution: they are home to the majority of EV fleets and owners, charging infrastructure, and the bulk of the growth in energy storage systems – making them ideal innovation grounds for battery circularity. This deployment ecosystem means the potential for demonstrating battery *circularity* is at our fingertips. It just needs some support and coordination.

Introducing *Project Closed Circuit:* at the heart of battery circularity.

Project Closed Circuit leverages The New York Climate Exchange's partner network of battery experts and resources, business and public–sector engagement, convening, and thought leadership to deliver:

- Framing and analytical content
- Key industry events that facilitate learning and collaboration
- Technology and regulation across and beyond our partners to advance a circular economy for batteries

What will this look like?

- **Awareness**: Expanding the network of individuals who are advancing battery circularity by sharing its importance with new audiences — from city officials to fleet operators, waste management professionals to insurers and financiers, and national security and supply chain logisticians to sustainability advocates.
- **Urban Solutions**: Developing communities of practice across and beyond the Exchange's partner network to ensure that local lessons from the battery ecosystem extend across geographies. These convenings will focus on researchers, city officials, regulators, startups and private sector businesses, fleets, and energy system developers.
- **Implementation**: *Project Closed Circuit* will initially focus on The Exchange's home — New York City. With a regulatory and economic framework that informs cities worldwide, NYC is poised to become a leading hub and global model for resource-efficient battery innovation, investment, and safe deployment. This will be achieved through policy, local access to battery data and end-of-life battery assets, and the development of a replicable roadmap for battery circularity in urban environments.

Want to learn more, get involved in, or receive updates about this project and its events?
Email us at batteries@nyclimateexchange.org with the subject line "Project Closed Circuit".

〈 Stony Brook University On Governors Island

Exchange Partners Welcome New Leadership 〉

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10 South Street, Slip 7

New York, NY 10004

Questions? Visit our **FAQ page** or email us at info@nyclimateexchange.org

May 25, 2026

Comments submitted via email to: sustainability@costamesaca.gov

City of Costa Mesa
Economic and Development Services Department
77 Fair Drive 2nd Floor
Costa Mesa, CA 92626

RE: Comments on City's Draft Climate Action and Adaptation Plan Policies

Dear Economic and Development Services Department,

Coastal Corridor Alliance (CCA) respectfully submits these comments on the City of Costa Mesa's draft Climate Action and Adaptation Plan (CAAP). We request to be notified of any and all future comment opportunities on the CAAP or its elements. Please add: *Admin@CoastalCorridor.org* to the distribution list.

Background
CCA, formerly the Banning Ranch Conservancy, led the decades-long effort to protect and create a permanent public open space of the 400-acre Banning Ranch property located between the borders of Costa Mesa, Newport Beach, and Huntington Beach, along the tidal influx zone of the Santa Ana River. Escrow closed in December 2022, permanently protecting 387 acres of Banning Ranch. The title was transferred to the Mountains Recreation and Conservation Authority (MRCA), a local joint powers authority that manages over 85,000 acres of parkland in Southern California. The property is now known as the Frank and Joan Randall Preserve/Genga (or simply Randall Preserve/Genga).

Our vision of conservation extends beyond the Randall Preserve/Genga to encompass the entire Coastal Corridor from the Pacific Ocean up the Santa Ana River to Adams Street in Costa Mesa. We seek to restore our natural lands, ensure functional habitat for wildlife, and promote the critical need for native biodiversity survival through education and built-environment reform in today's context of late-stage ecological destruction.

Comments

General Comments

We would like to see climate and sustainability planning in Costa Mesa, or any location, first inventory and prioritize the needs of the preexisting and preeminent local native ecosystems. Local, regional, and global ecosystems serve as Earth's irreplaceable, self-regulating life-support systems.

Climate change, environmental injustice, and resource collapses are not just emissions, pollution, and human resource efficiency problems—they are symptoms of a deeper root cause: the destruction of native biodiversity by the expanding built human environment. Climate science points to the biodiversity crisis at the center, and prioritizes restoration over innovation (**Attachment 1**).

While decarbonizing Costa Mesa should be a goal the City strives for in this CAAP, our primary and most effective focus would be to shift our relationship with nature and cede land and resources back to local, regional, and global native living systems. Engineering, technology, and green planning cannot effectively reduce human impacts to accommodate all of what modern human populations want and need, *and* effectively replicate or replace the natural systems that regulate our air, water, and carbon cycles.

Global, Regional, Local: To make our local air, water, and soil cleaner is crucial. But for as long as our populations require remote resources for support, we simply push our air, water, and soil impacts elsewhere. This is just another form of (out of sight and out of mind) environmental injustice for humans, and reinforces the ecological destruction that drives the global climate crisis that local CAAPs try to address. Those global impacts come back around at larger scales to affect all local places too, even if local areas end up with cleaner resources. Climate action in this frame looks like taking responsibility for all of our local and remote impacts, reducing or ending our reliance on remote water, air, mineral, and food resources, and reorienting our local infill spaces for food, sustainable goods production, and native biodiversity recovery.

Climate action based on ecology prioritizes the restoration of all of our suitable natural areas to native habitats, and creating/ceding massive amounts of local, regional, and global space back for wildlife and habitat connectivity.

We hope our comments encourage Costa Mesa's CAAP toward actions that help recover biodiversity as a first and most effective priority.

Prioritized Comments

Our comments on the 2026 Draft CAAP below are grouped by Plan Sector, with Sectors ordered by priority related to our comments. Each comment is referenced by Plan Sector, Location (PDF page), Plan Objective, Plan Action, and CCA's comment.

Sector: Natural and Urban Lands
Location: Pg. 9
Comments: We respectfully request that this Sector gets careful and robust reframing. Natural and Urban lands are very different, which should warrant separate Sectors. The existing action items apply almost exclusively to Urban Lands and their orientation for human benefits rather than prioritizing Natural Lands and (local, native) nature-based solutions.

- **We request Natural Lands become a new, banner 'Sector' of the CAAP plan** focusing on clearly defined, legally bound native biodiversity goals. Actions should support ecosystem recovery on Natural Lands, as this is our best and most effective action to take to mitigate anthropogenic climate change.
    - We request, Costa Mesa add specific restoration and rewilding goals, actions, and ordinances as the European Union does, that remove invasive plants, restore already-available open spaces to functioning locally native habitats, and remove human infrastructure that blocks otherwise available native habitats.
    - Please include consideration of Costa Mesa's position within our bioregion and within the California Floristic Province, acknowledging our City's impact on the fragmentation of native habitats, and its effects on the climate and livability of our built world, as Santa Barbara does in its CAAP.
    - Other documents for reference:
        - CAAPS from San Diego, Santa Cruz
        - Costa Mesa General Plan, Conservation Element
        - Fairview Park Master Plan's California Environmental Quality Act (CEQA) Initial Study/Mitigated Negative Declaration Appendices B-1 and C-3.

- **Urban Lands (Existing Sector):**
    - Native or edible plants: We request all rules, references, outreach, educational or community programs related to the use of plants (Plan-wide) including tree canopies, tree planting, tree replacements, urban greening, shade plants, drought tolerant plants, or landscaping, make a clear prioritization for either locally native plants or edible cultivars for local food production. Please clearly deprioritize or ban planting non-native or non-edible plants in CAAP actions and policies, as they contribute to biodiversity loss. Instead, please share the benefits of locally native plant species and local food production as solutions.

Native plants provide drought tolerance, shade / canopy, sequestration, and more, while also supporting native pollinators, wildlife, natural soil composition, natural water treatment for the watershed (except for Action d., see Water and Wastewater comment).

- Consider adding an action to include public promotion and incentives for residents and developments to participate either in 'homegrown national park' native landscapes (https://homegrownnationalpark.org/) (CCA would be glad to help strategize), or micro-farmed food production for locals.
- We support all initiatives that incentivize and expand local food production within infill spaces. Please specify that no additional natural lands encroachments should occur for the sake of food production. We have some other incentivized ideas that support job creation that we can share upon request.
- All civic tree installations or replacements must be to native trees or food production. See Pasadena's urban forestry information: https://www.cityofpasadena.net/public-works/urban-forestry/
- Consider policies to block the sale of known invasive plant species from nurseries, garden centers, and more. Look to California Native Plant Society (CNPS), California Invasive Plant Council (CAL-IPC), and Ron Vanderhoff at Roger's Gardens for consultation (rvanderhoff@sbcglobal.net).
- Please define 'Urban Greening' to include recovery for locally native species, Dark Sky, bird safe windows, invasive honeybee and other invasive pollinator management, and more.

Sector: Water and Wastewater
Location: Pg. 6
Comment: We hope this Sector gets a more robust nature-first framework. Local watersheds and dependent native ecosystems must be primary considerations, as they comprise the foundation of all human and nonhuman life of a place.

- We request that all references, examples, and methods related to the use of plants for shade, drought tolerance, or any other benefits be focused exclusively on diverse locally native plant palettes, or cultivars that provide local human food production. We ask the City to commit to working with consultants from groups such as the CNPS, CAL-IPC, and others to create native wildlife friendly landscapes. Ornamental plant palettes support invasive pollinators and other non-native species, whose presence displaces and competes with native biodiversity.
- Local watersheds are engineered to cut off dependent ecosystems through hardened walls and barriers, which would need to be prioritized for removal to recover biodiversity. Please consider forming a framework for long term watershed infrastructure removal.
- Add an action item focused on low-impact development (LID) that mimics natural hydrology. Ensure stormwater capture basins, bioswales, and daylighted drainage systems are designed as

living wetlands rather than concrete or synthetic retention cells. This filters urban runoff naturally before it reaches the ocean while providing immediate avian and amphibian habitats.

Sector: People and Community
Location: Pg. 10 - 11
Comment: We generally support the action items, with a few critiques listed below. We urge the City:

- To prioritize implementing long term solutions like native habitat and watershed restoration that decrease the needs for short term solutions.
- Not to promote 'Green' jobs or businesses that might trade local immediate improvements for global or long term impacts.
- Prioritize sustainably sourced natural materials in efforts to provide relief, and avoid plastics which harm native ecosystems' ability to thrive and regulate the planetary temperatures.

Sector: People and Community
Location: Pg. 11
Objective: PC3: Build City and Regional Capacity for CAAP Implementation
Action: "d. Coordinate with the following agencies on dam operational planning and related flood risks:

• U.S. Army Corps of Engineers Los Angeles District
• Irvine Ranch Water District
• County of Orange"

Comment: Our watersheds are highly engineered, which cuts off their natural functions to support the ecosystems' environmental regulatory systems. Watershed infrastructure might protect human homes from floods, but they accelerate the trajectory toward a warming environment. Watershed infrastructure must be removed, not added for short term climate relief. City policies should reflect this priority, and City involvement in regional planning should promote this practice. Instead of cutting off river and tide functions to protect infrastructure, infrastructure should move out of the way of rivers and tides (**Attachment 2**).

Sector: People and Community
Location: Pg. 11
Objective: PC4. Foster Local Sustainable Practices
Action: "e. Engage local Non-Governmental Organizations (NGOs) and compile a list relative to their interests and capabilities on a variety of topics related to climate action and adaptation, such as distributing related news or grant opportunities, or participating in or facilitating volunteer events such as clean ups or tree plantings."
Comment: CCA is available and willing to engage with the City on these topics and activities.

Sector: On-Road Transportation
Location: Pg. 2
Objective: T1. Transition to Electric Vehicles
Comment: We generally support the listed action items. Please add actions to incentivize and plan electrification deployment within a closed-loop second-life framework to reduce rare earth mining impacts. Local improvements should not come with additional global impacts **(Attachment 3)**.

Sector: On-Road Transportation
Location: Pg. 2
Objective: T2. Promote Walking and Biking
T3. Reduce Single-Occupancy Vehicle Trips
T4. Increase Public Transportation Use
Comment: We generally support the action items, though not at the expense of more use of plastics or other environmentally harmful materials or activities. We request the City limit materials to sustainably sourced natural materials and focus on design efficiency, biodegradation, and simplification.

Sector: On-Road Transportation
Location: Pg. 2
Objective: T5. Support Smart Growth
Comment: We urge the City to consider how biodiversity is already too constrained, and how continued growth works against climate adaptation.

Sector: Energy and Buildings
Location: Pg. 4
Objective: E1. Reduce Energy Demand in Buildings
Action: "c. Seek grants to offer incentives for cool roofs and walls during roof replacements or renovations."
Comment: Please consider policies / building requirements which include other passive cooling and heating systems of various types (air towers, trombe walls, etc.) for all new construction. Consider hybrid local-earth building materials to reduce resource needs, plastic use, promote in-ground infill building, and more.

Sector: Energy and Buildings
Location: Pg. 4
Objective: E2. Decarbonize Building Energy Use
Comment: We support actions a. - c. However, for d., we recognize that Green Building standards still have major tradeoffs, particularly in the prolific use of plastic and other harmful materials. Consider celebrating those that go beyond Green Building by sustainably sourcing natural building materials.

Sector: Energy and Buildings
Location: Pg. 4
Objective: E3. Increase Carbon-Free Energy Supply
Comment: We provide our general support. Find incentives / ways to keep electrification circular, engage in second-life platforms (See comment above).

Sector: Solid Waste
Location: Pg. 7
Objective: SW1. Reduce Waste Generation
Comment:

- We provide our support for all, with special support for Action b**.**
- Consider adding actions for easy City-supported e-waste drop-off / recycling, and facilities for handling fats, oils, and grease waste.
- Please consider having City Departments join the OC Trash and Debris Task Force quarterly meetings CCA participates in. Email jesse.aragon@pw.oc.gov to participate.

Sector: Off-Road Equipment
Location: Pg. 8
Objective: OR1. Accelerate Zero-Emission Off-Road Equipment Adoption
Comment: We provide our general support. However, see the above comments on circular electrification and second-life programs to reduce mining impacts.

Sector: Municipal
Location: Pg. 12 - 13
Comment: We can provide our general support for action items, with relevant above comments for other Sectors applied: native-first plantings, second-life electrification, embargo on plastic infrastructure, etc.

Conclusion

We appreciate the City's work on the draft CAAP. Thank you for the opportunity to provide comments on this plan. We understand that ecosystem centrality with its needs and limits have not made its way into widespread public discourse or planning solutions. It's a change in paradigm compared to what most of

us were raised to think and believe about what we humans can or can't sustainably do. We respectfully submit our comments with this in mind.

Should you have questions, please reach out to Paul Waggoner at: (949) 820-9094.

Sincerely,



Terry M. Welsh, MD
Board President

Attachments:
1 - UN: Biodiversity - our strongest natural defense against climate change
2 - Restoring Free-flowing Rivers in Europe
3 - Project Closed Circuit: Helping Cities Lead on EV Battery Circularity

Attachment 1
Source: https://www.un.org/en/climatechange/science/climate-issues/biodiversity

Climate Action (/en/climatechange)

Biodiversity - our strongest natural defense against climate change



The Earth's land and the ocean serve as natural carbon sinks, absorbing large amounts of greenhouse gas emissions. Conserving and restoring natural spaces, and the biodiversity they contain, is essential for limiting emissions and adapting to climate impacts.

Biological diversity — or biodiversity (https://www.unep.org/unep-and-biodiversity?_ga=2.141360562.1630766004.1661203745-120134052.1634700687) — is the variety of life on Earth, in all its forms, from genes and bacteria to entire ecosystems such as forests or coral reefs. The biodiversity we see today is the result of 4.5 billion years of evolution, increasingly influenced by humans.

Biodiversity forms the web of life that we depend on for so many things – food, water, medicine, a stable climate, economic growth, among others. Over half of global GDP (https://blogs.worldbank.org/voices/business-case-nature#:~:text=According%20to%20the%20World%20Economic,have%20created%20new%20biodiversity%20funds) is dependent on nature. More than 1 billion people rely on forests (https://www.un.org/en/desa/5-things-you-should-know-about-how-forests-benefit-people-and-planet) for their livelihoods. And land and the ocean absorb more than half of all carbon emissions.

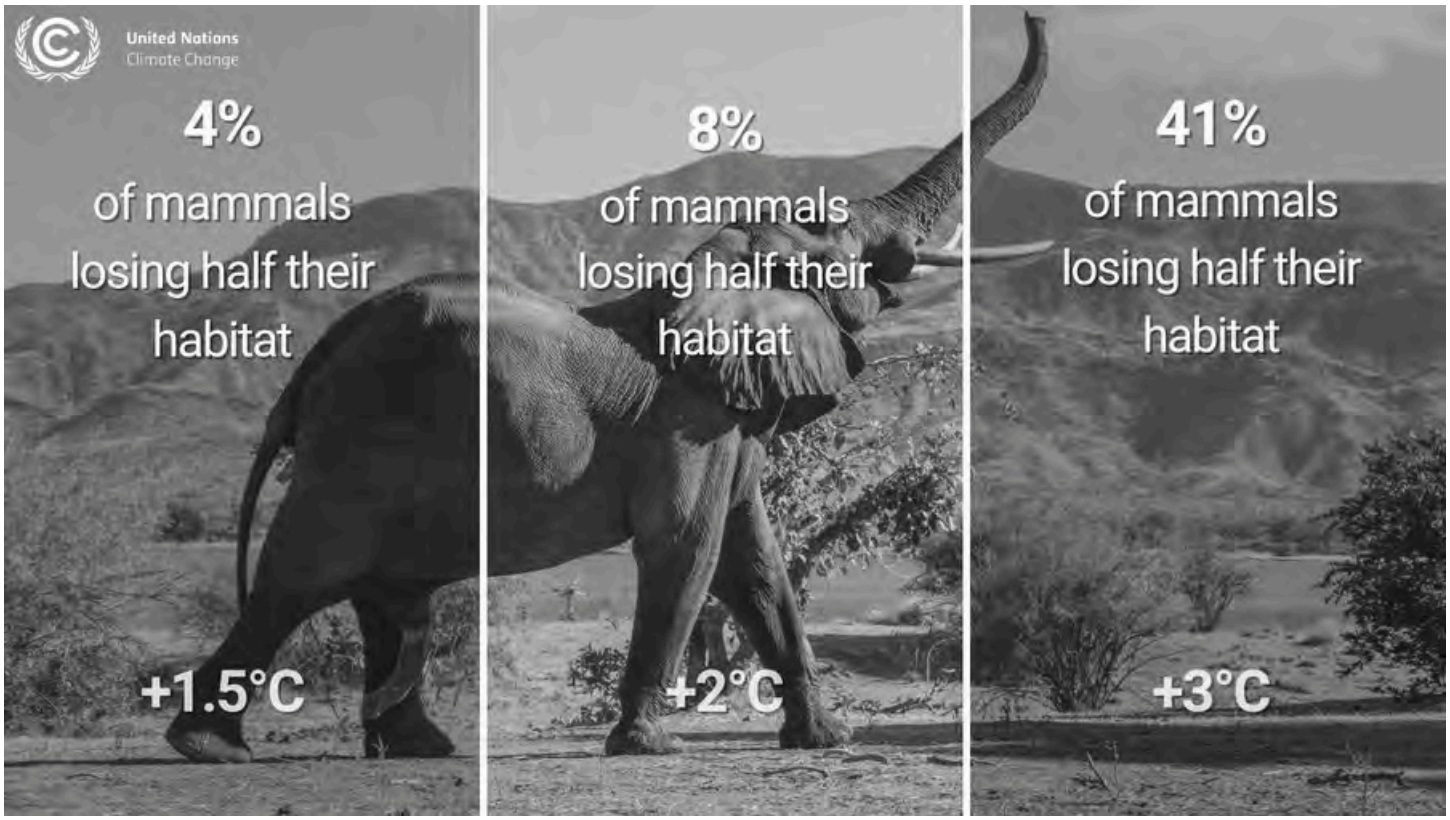
But nature is in crisis. Up to one million species (https://ipbes.net/news/Media-Release-Global-Assessment) are threatened with extinction, many within decades. Irreplaceable ecosystems like parts of the Amazon rainforest (https://wmo.int/media/news/role-of-amazon-carbon-sink-declines-nature-study) are turning from carbon sinks into carbon sources due to deforestation. And 85 per cent of wetlands (https://ipbes.net/news/Media-Release-Global-Assessment), such as salt marshes and mangrove swamps which absorb large amounts of carbon, have disappeared.

How is climate change affecting biodiversity?

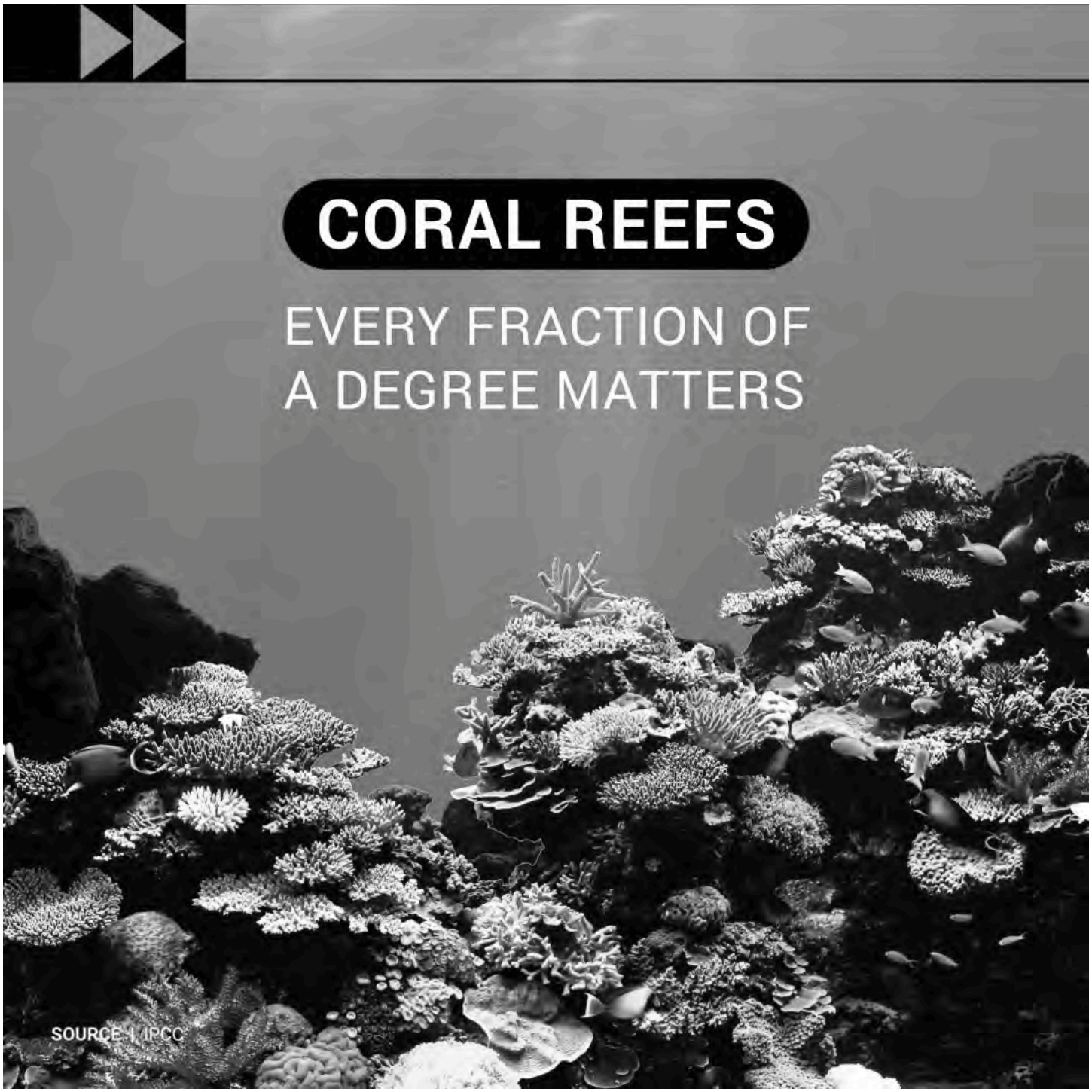
The main driver of biodiversity loss remains humans' use of land (https://www.unccd.int/land-and-life/biodiversity/overview) – primarily for food production (https://www.unep.org/news-and-stories/press-release/our-global-food-system-primary-driver-biodiversity-loss). Human activity has already altered over 70 per cent of all ice-free land. When land is converted for agriculture, some animal and plant species may lose their habitat and face extinction.

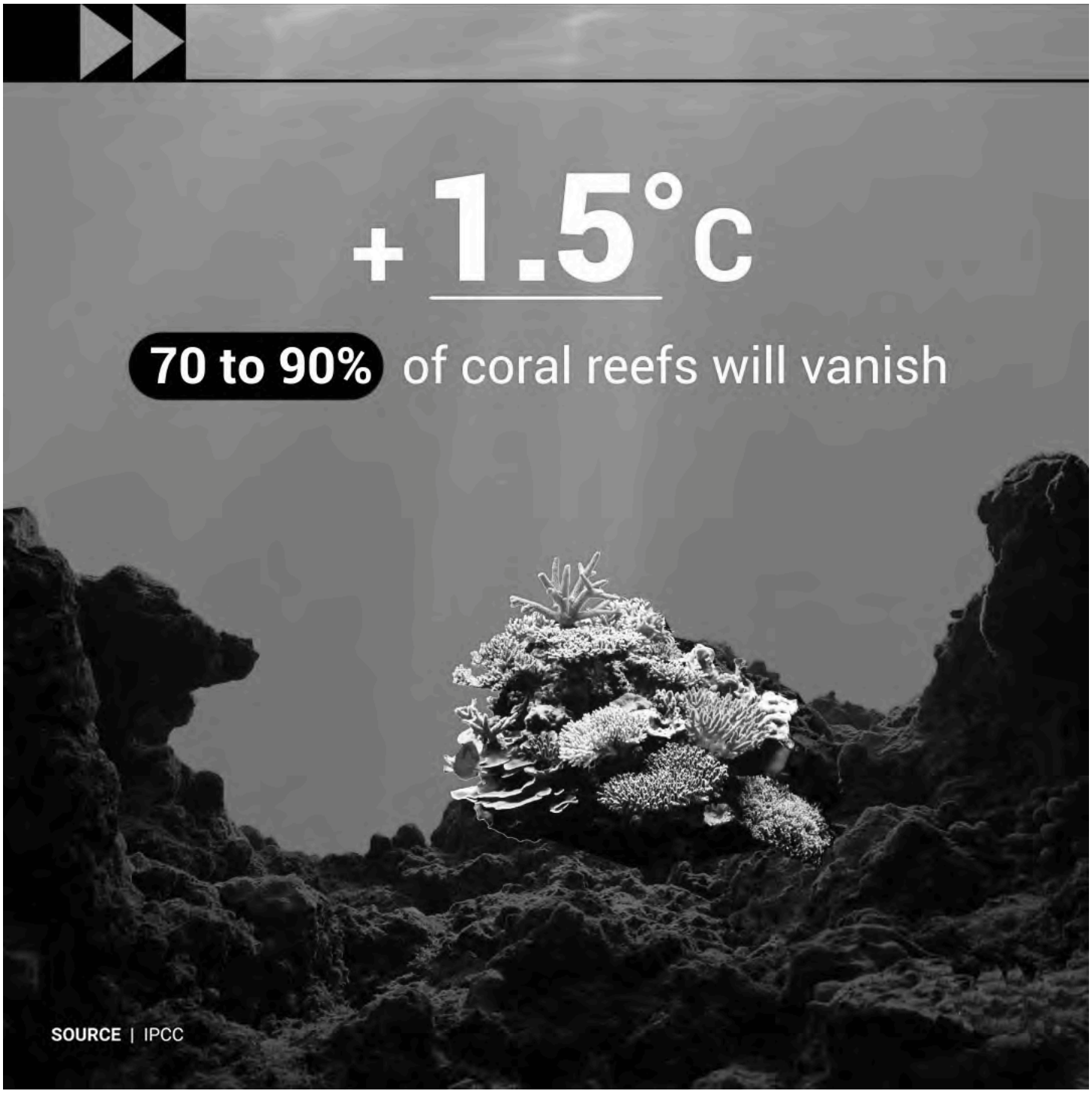
But climate change (https://www.un.org/en/climatechange/what-is-climate-change) is playing an increasingly important role in the decline of biodiversity. Climate change has altered marine, terrestrial, and freshwater ecosystems around the world. It has caused the loss of local species, increased diseases, and driven mass mortality of plants and animals, resulting in the first climate-driven extinctions.

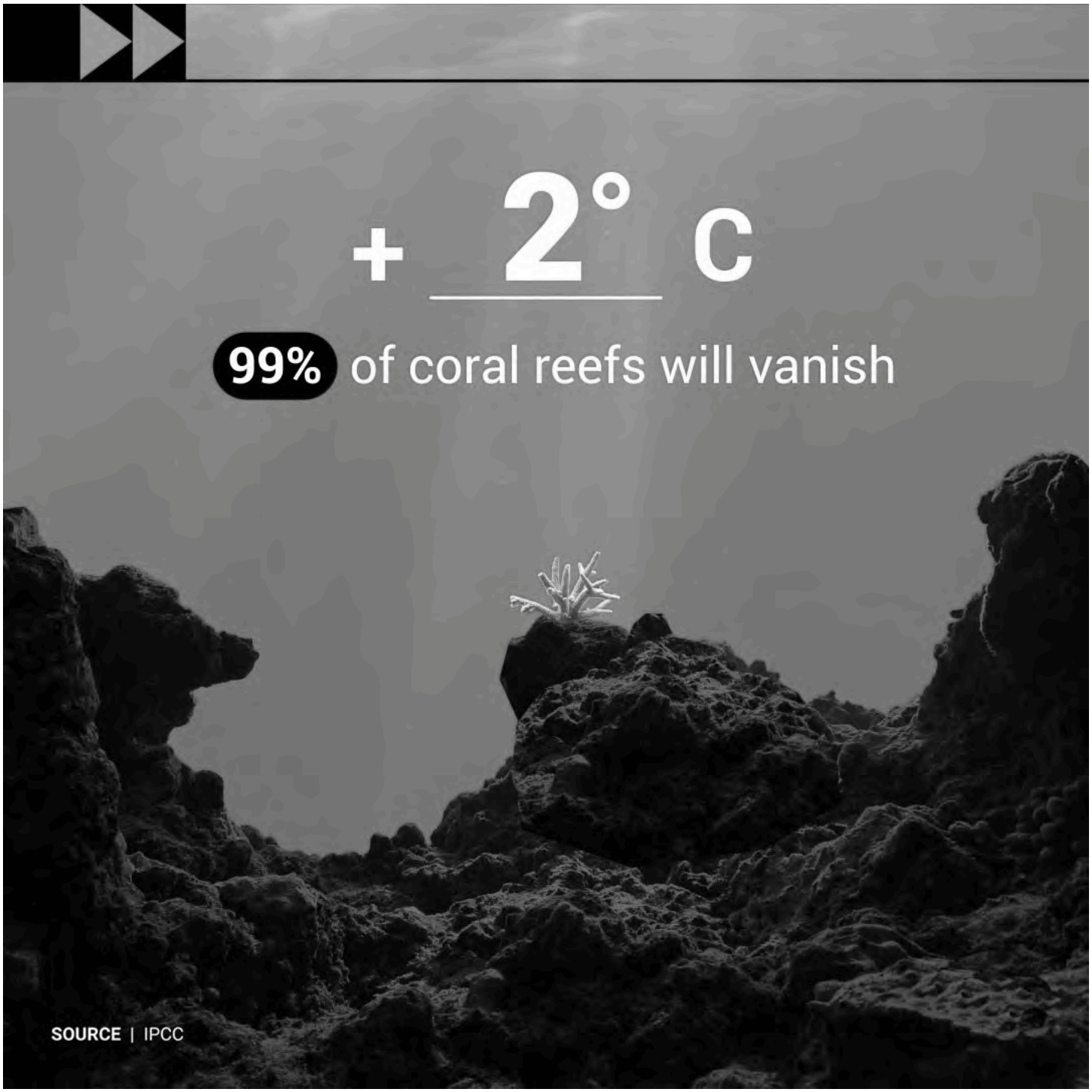
On land, higher temperatures have forced animals and plants to move to higher elevations or higher latitudes, many moving towards the Earth's poles, with far-reaching consequences for ecosystems. The risk of species extinction (https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_CCP1.pdf) increases with every degree of warming.



In the ocean, rising temperatures increase the risk of irreversible loss of marine and coastal ecosystems (https://www.ipcc.ch/report/ar6/wg2/chapter/chapter-3/). For instance, 14 per cent of the coral (https://www.unep.org/topics/ocean-seas-and-coasts/blue-ecosystems/coral-reefs) from the world's coral reefs was lost between 2009 and 2018, mostly due to climate change, and further warming threatens to destroy almost all remaining reefs.


CORAL REEFS
EVERY FRACTION OF
A DEGREE MATTERS
SOURCE | IPCC


+1.5°c
70 to 90% of coral reefs will vanish
SOURCE | IPCC



Overall, climate change affects the health of ecosystems (https://www.who.int/news-room/fact-sheets/detail/biodiversity-and-health), influencing shifts in the distribution of plants, viruses, animals, and even human settlements. This can create increased opportunities for animals to spread diseases (https://www.who.int/news-room/fact-sheets/detail/biodiversity-and-health) and for viruses to spill over to humans. Human health can also be affected by reduced ecosystem services, such as the loss of food, medicine and livelihoods provided by nature.

Why is biodiversity essential for limiting climate change?

When human activities produce greenhouse gases, around half of the emissions remain in the atmosphere, while the other half is absorbed by the land and ocean (https://www.unep.org/news-and-stories/story/five-ecosystems-where-nature-based-solutions-can-deliver-huge-benefits). These ecosystems – and the biodiversity they contain – are natural carbon sinks, providing so-called nature-based solutions to climate change.

Protecting, managing, and restoring forests (https://www.un-redd.org/), for example, offers roughly two-thirds of the total mitigation potential of all nature-based solutions. Despite massive and ongoing losses, forests still cover more than 30 per cent of the planet's land.

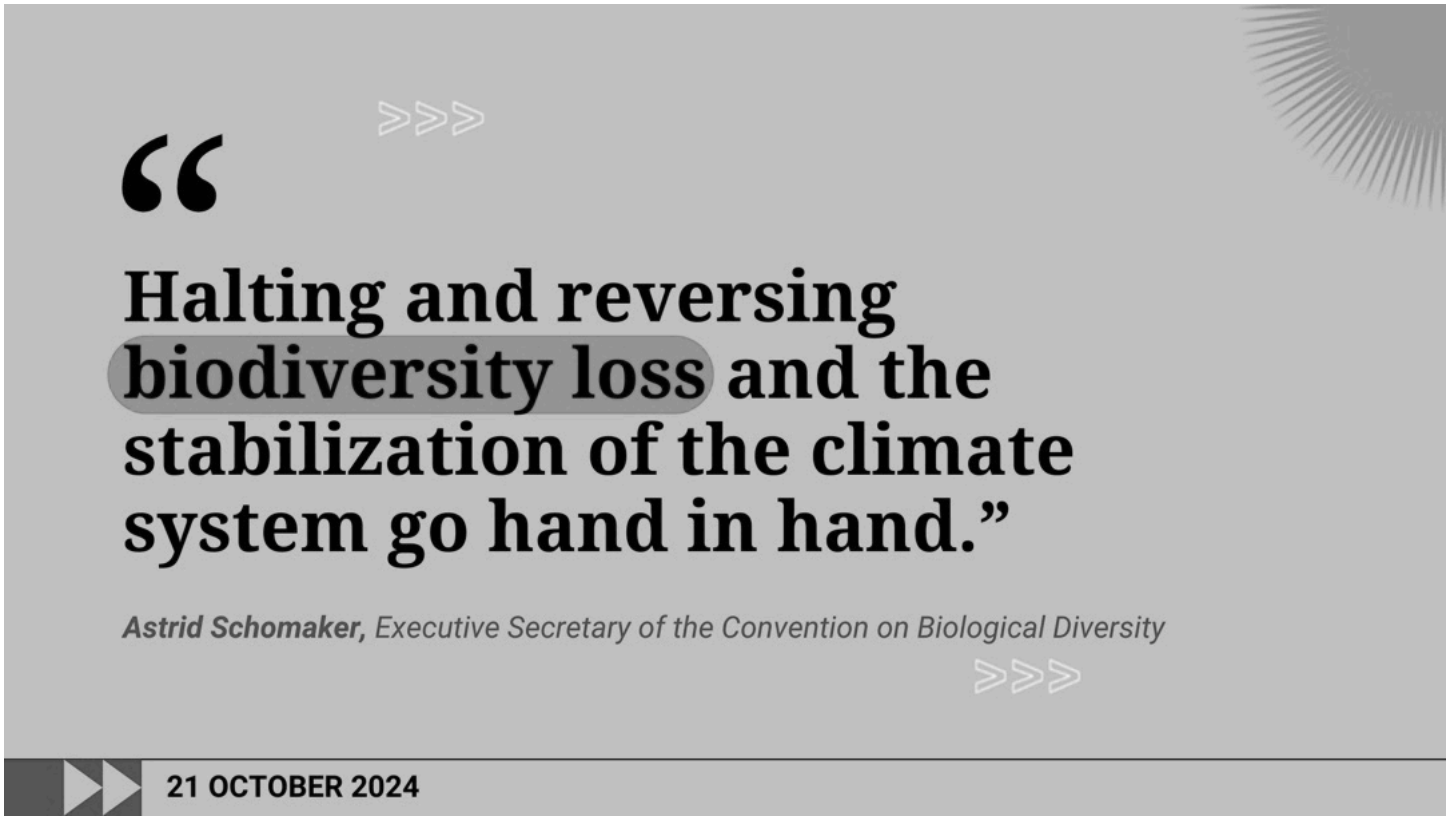
Peatlands (https://www.unep.org/news-and-stories/story/peatlands-store-twice-much-carbon-all-worlds-forests) – wetlands such as marshes and swamps – cover only 3 per cent of the world's land, but they store twice as much carbon as all the forests. Preserving and restoring peatlands means keeping them wet so the carbon doesn't oxidize and float off into the atmosphere.

Ocean habitats such as seagrasses and mangroves (https://www.unep.org/explore-topics/oceans-seas/what-we-do/protecting-restoring-blue-carbon-ecosystems/why-protecting) can also sequester carbon dioxide from the atmosphere (https://unfccc.int/news/protecting-the-ocean-critical-for-climate-action) at rates up to four times higher than terrestrial forests can. Their ability to capture and store carbon make mangroves highly valuable in the fight against climate change.

Conserving and restoring natural spaces (https://wedocs.unep.org/xmlui/bitstream/handle/20.500.11822/35360/NatClim.pdf), both on land and in the water, is essential for limiting carbon emissions and adapting to an already changing climate. About one-third of the greenhouse gas emissions reductions needed (https://www.unep.org/resources/factsheet/nature-climate-action) in the next decade could be achieved by improving nature's ability to absorb emissions.

Is the UN tackling climate and biodiversity together?

Climate change and biodiversity loss (as well as pollution) are part of an interlinked triple planetary crisis (https://unfccc.int/blog/what-is-the-triple-planetary-crisis) the world is facing today. They need to be tackled together (https://news.un.org/en/story/2021/04/1090762) if we are to advance the Sustainable Development Goals (https://www.un.org/sustainabledevelopment/sustainable-development-goals/) and secure a viable future on this planet.



Governments deal with climate change and biodiversity through two different international agreements – the UN Framework Convention on Climate Change (https://unfccc.int/) (UNFCCC) and the UN Convention on Biological Diversity (https://www.cbd.int/) (CBD), both established at the 1992 Rio Earth Summit.

Similar to the historic Paris Agreement (https://www.un.org/en/climatechange/paris-agreement) made in 2015 under the UNFCCC, parties to the Biodiversity Convention in December 2022 adopted an agreement for nature, known as the Kunming-Montreal Global Biodiversity Framework (https://www.cbd.int/article/cop15-final-text-kunming-montreal-gbf-221222), which succeeds the Aichi Biodiversity Targets (https://www.cbd.int/sp/targets/) adopted in 2010.

The framework includes wide-ranging steps to tackle the causes of biodiversity loss worldwide, including climate change and pollution, and should work in synergy with the Paris Agreement (https://press.un.org/en/2021/sgsm20959.doc.htm).

“Delivering on the framework will contribute to the climate agenda, while full delivery of the Paris Agreement is needed to allow the framework to succeed,” said Inger Andersen (https://www.unep.org/news-and-stories/speech/towards-strong-targeted-post-2020-global-biodiversity-framework), the head of the UN Environment Programme. “We can’t work in isolation if we are to end the triple planetary crises.”

At COP15 in December 2022, governments met in Montreal, Canada (https://www.unep.org/events/conference/un-biodiversity-conference-cop-15), and agreed on the new framework to address biodiversity loss, restore ecosystems and protect the rights of Indigenous Peoples, who suffer disproportionately (https://www.unep.org/news-and-stories/story/indigenous-peoples-and-nature-they-protect) from biodiversity loss.

“Indigenous Peoples, people of African descent, and local communities are guardians of our nature,” said the UN Secretary-General. “Their traditional knowledge is a living library of biodiversity conservation. They must be protected. And they must be part of every biodiversity conversation.”

At the meeting, the parties also adopted the Multilateral Mechanism on the fair and equitable sharing of benefits arising from the use of digital sequence information (https://www.fao.org/cgrfa/topics/digital-sequence-information/en/) on genetic resources.

In November 2024, at COP16 in Cali, Colombia, countries reached a historic consensus, including on the functioning of a fund, known as the Cali Fund, aimed at mobilizing new streams of funding for biodiversity action worldwide and boosting the implementation of the framework.

The Cali Fund was launched (https://www.un.org/sustainabledevelopment/blog/2025/02/press-release-cop16/) in Rome, Italy, in February 2025 on the margins of the resumed session of COP16. It is set to receive contributions from private sector entities making commercial use of data from genetic resources, with the aim to raise an additional $200 billion each year by 2030 to close the global biodiversity finance gap.

“Those profiting from nature cannot treat it like a free, infinite resource. They must step up and contribute to its protection and restoration,” the UN Secretary-General said.

Learn more

Read the UN Secretary-General’s speech at the High-Level Segment of COP16 (https://www.un.org/sg/en/content/sg/statement/2024-10-29/secretary-generals-remarks-the-high-level-segment-of-cop16-biodiversity-trilingual-delivered-scroll-down-for-all-english) in November 2024, and his remarks ahead of the resumed opening session of COP16 in February 2025 (https://www.un.org/sg/en/content/sg/statement/2025-02-25/secretary-generals-message-the-resumed-opening-session-of-cop16-biodiversity).

Watch our interview with Elizabeth Mrema (https://www.un.org/en/climatechange/thought-leaders-elizabeth-mrema), former Executive Secretary of the United Nations Convention on Biological Diversity.

Hindou Ibrahim: Living in harmony with nature (https://www.un.org/en/climatechange/thought-leaders-hindou-ibrahim)

"Indigenous peoples are a solution, we are not only a victim of the climate change," says SDG Advocate and Indigenous rights activists Hindou Ibrahim.



(https://www.un.org/en/climatechange/elliott-harris-measure-value-nature)

Elliott Harris: Measure the value of nature – before it's too late (https://www.un.org/en/climatechange/elliott-harris-measure-value-nature)

UN Chief Economist Elliott Harris introduces a ground-breaking shift in valuing nature as a way of making more informed decisions about economies, climate action and the protection of biodiversity.

Attachment 2
Source: https://www.nature.org/en-us/about-us/where-we-work/europe/stories-in-europe/restoring-free-flowing-rivers-in-europe/



CONFLUENCE The Morača and Zeta rivers meet in Montenegro. © TNC/Chip Carroon

STORIES IN EUROPE

Restoring Free-flowing Rivers in Europe

A practitioner's toolkit for dam removal

SHARE

In This Guide:

1. Introduction

2. Why Remove Dams

3. Project Phases

Financing Options

OVERVIEW

This is an introductory resource guide for those new to restoring rivers through dam removal.

In the coming year, the toolkit will be developed into a more comprehensive guide and training for practitioners. In the interim, we would be honored to have your input on the scope and content, to better support your needs. For the latest news and developments on barrier removal, please have a look at our European Case Studies, Financing Options and Resources pages.

1. Introduction

Rivers provide freshwater and fisheries to sustain us, support our farms, drive industry, and power our homes. We rely on rivers as transportation corridors connecting our seaports with inland towns. And we value our rivers for recreation such as fishing, boating, and swimming.

Such heavy use, however, has impacted the health of this important resource globally.

With more than 1 million dams, European rivers are among the most developed. This cumulative impact is one of the leading causes of the > **80% decline of freshwater biodiversity and a loss of 55% of the abundance of monitored migratory fish populations.**

While many dams in Europe deliver invaluable services – like critical water supplies and flood risk reduction – it is estimated that **tens of thousands no longer serve their**

flood-risk reduction, and more cost-effective ways of producing renewable energy, provide new solutions to better meet our needs.

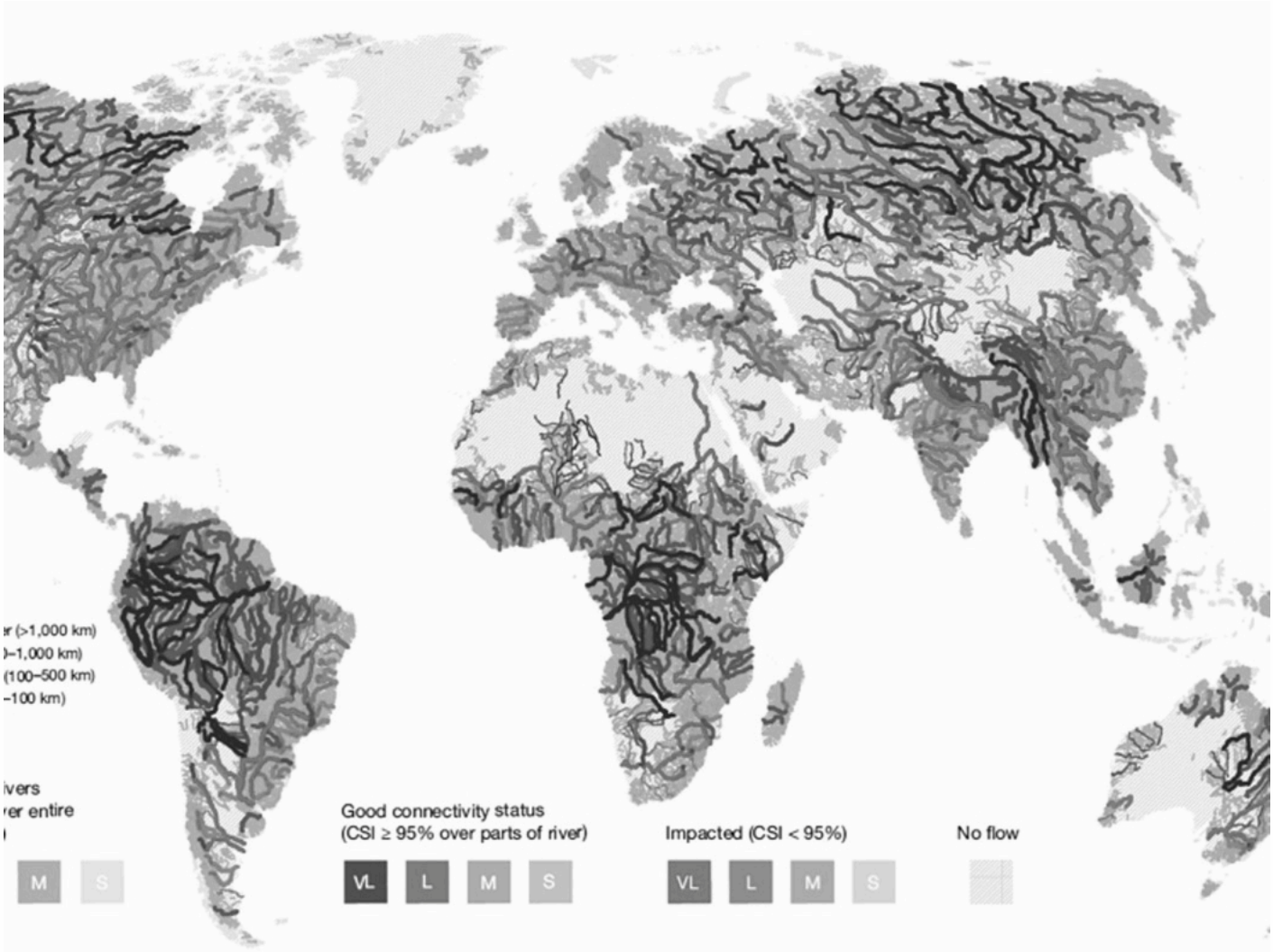


FIGURE 1 Global status of free-flowing rivers (Grill 2019).

Removing barriers to river health

This creates an unprecedented opportunity to re-think our infrastructure and restore European rivers, their biological diversity and the vital services they provide our communities. And we're doing just that.

To date, The Nature Conservancy has worked with partners to **remove more than 100 stream barriers in the U.S.**, restoring thousands of river kilometers which provide social and ecological benefits.

We've used this experience to invest deeply in the science of 'where,' to identify which future projects will provide the greatest ecological benefits, the science of 'how,' to understand which approaches work, and to pursue innovative policies and finance solutions that move beyond project-by-project decisions to address the scale of the problem for people and nature.

In Southeast Europe, we are sharing our expertise with local partners to support the development of their restoration strategies and, more broadly, we are partnering with Dam Removal Europe to support the growing movement to restore European rivers.

MOVE THE SLIDER ON THE IMAGE BELOW TO SEE THE BEFORE AND AFTER OF THE ENNERDALE MILL WEIR REMOVAL.



ENNERDALE MILL WEIR REMOVAL Ennerdale Mill Weir removal is an example of a successful project that was accomplished with limited complexities while managing sediment removal for protected mussels. © West Cumbria Rivers Trust

Aim of this toolkit

We've summarized a collection of introductory resources for partners who are generally new to using dam removal as a tool for river restoration and are interested in learning how to approach a new project or engage in an existing project.

The toolkit synthesizes resources for communicating the benefits, understanding finance options and an overview of the process and issues that drive a dam removal project, and key issues to consider in design and construction.

the future.

In the coming year we aim to work with partners to develop this toolkit into a more comprehensive guide and training for practitioners. In the interim, we would be honored to have your input on helpful scope and content, to ensure the resource supports your needs. Please contact us here.

Terminology

Barriers on rivers, include dams, weirs, road and railroad crossings, levees and more, that fragment our rivers, impacting both up and downstream flow as well as the connection to the floodplain. For this toolkit we focus on dams and weirs. We will use the term "dam" inclusively to refer to barriers that span the stream channel for the purposes of impounding or diverting water, block the natural movement of water, fish, sediment and nutrients in the river. Dams can be made of any combination of concrete, stone, brick or earth, and may have been built for many different purposes such as hydropower, water supply, or recreation.

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2. Why Remove Dams?



ON THE PENOBSCOT An unprecedented array of partners, including the Nature Conservancy and the Penobscot Indian Nation, have come together to accomplish the goal of restoring the Penobscot River. © Bridget Besaw

While the exact number is not yet known, it is estimated that there are more than 1 million stream barriers in Europe. Many still serve vital functions, like water supply, and flood risk reduction. However, it is estimated that tens of thousands are no longer in use, nearing the end of their design life, and in need of review to assess whether decommissioning and removal is an economically and environmentally effective path forward.

Over the past 25 years, led by countries including France, Spain, Sweden, Finland, Estonia and the United Kingdom, preliminary findings show that more than 4,500 dam, weir and barrier removals have been implemented in Europe.

Common reasons for pursuing barrier removal in Europe have included one or a bination of the following:

- Public safety concerns due to risk of failure during flood events
- Reduced capacity and function due to sedimentation
- Restore migratory fish pathways
- Restore ecological functions and ecosystem services
- Restore habitat for endangered fish and wildlife

Ecological and Socio-economic Benefits

Dams have a wide range of impacts on the environment and local communities, including loss of biodiversity, blocking fish migrations, trapping sediment and nutrients that maintain habitat and estuary health, and altering flow patterns that drive the productivity of downstream floodplains and wetlands.

The selective removal of dams can restore the natural flows and conditions of rivers, as well as the societal and economic benefits that rivers provide. Increasingly, dam owners and communities see dam removal as a long-term option and are enjoying the benefits of a free-flowing river.

ECOLOGICAL BENEFITS

While the specific ecological response to a dam removal project will be different for each river and watershed, there are general observations and conclusions that have been made from synthesizing the body of research published to date that provide a helpful foundation for predicting responses for future projects.

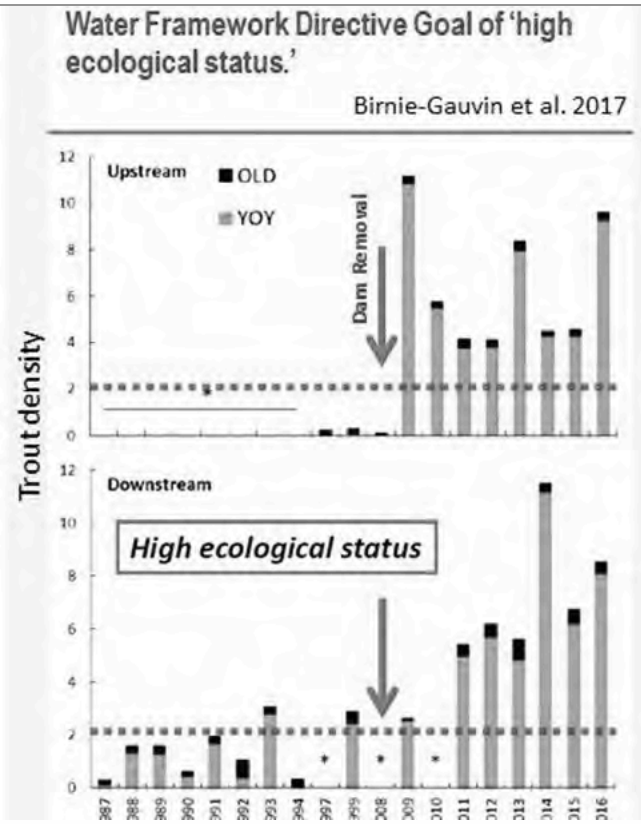
ntly, the Dam Removal Synthesis Working Group, a consortium of 22 scientists from . government, academic and NGO organizations, summarized existing monitoring data

This collection of studies has found:

- **Rivers respond quickly**. Physical responses to dam removals are typically fast, with the rate of sediment movement from the site largely dependent on sediment characteristics and dam removal strategy. Functional connectivity is also quickly restored, sometimes immediately, between upstream and downstream river reaches, including the movement of material and organisms.
- **Watershed-scale benefits and climate resilience.** Dam removal is one of the few reach-specific restoration practices that has demonstrated the potential for providing watershed-scale restoration and enhancing watershed resilience in the face of human-caused changes to the landscape and climate.
- **Restoration of river processes and functions.** Removals improved nutrient and sediment transport and substrate distribution. After a dam removal, stream functions may be fully restored in less than 10 years and frequently in less than five. Compared to other stream restoration techniques, dam removals restore self-sustaining processes, requiring minimal maintenance and delivering more sustainable environmental outcomes.
- **Species and population recovery.** Dam removal projects have consistently restored up and downstream passage for resident and migratory fish, including sea-run fish. Where sea-run fish populations have recovered, marine fisheries, have benefited. Monitoring reveals improvement to the quantity, age distribution and diversity of stream-dependent fish species, increased quantity and distribution of freshwater mussels and stream-dependent invertebrates and improved mammal and bird habitat.
- **Water quality improvements.** Improvements to water quality, especially ambient temperature, dissolved oxygen and nutrients.

in habitat type (from lake to stream), release of sediment from behind the impoundment and allowing non-native species to gain access to areas from which they were previously excluded by the barrier. These potential risks should be thoroughly assessed before implementing a project. Quantitative modeling capability is improving, particularly for physical and broad-scale ecological effects, giving managers predictive tools for more informed and precise decision making. Ecological responses differ upstream, downstream and within the inundation zone and there are empirical observations to help with predictions in each of these impact areas.

In summary, barrier removal projects, when properly sited and carefully managed, can be highly durable ecosystem restoration actions that permanently increase habitat connectivity and improve processes and functions important for the health of connected freshwater and estuary habitats.



- Kernan Dam, Léguer River, France
- Kentchurch Weir, River Monnow, Wales
- Maisons-rouges Dam, Vienne River, France
- Vilholt Dam, Gudenaa River, Denmark
- Yecla de Yeltes Dam, Huebra River, Spain
- Pärnu watershed restoration, Estonia

Read more about these case studies and others through Dam Removal Europe: https://damremoval.eu



SOCIAL AND ECONOMIC BENEFITS

The benefits of a project will vary, in general they will be a factor of the position of the dam within the watershed, relative to other resources and threats, the condition of the dam, the complexity of the project and its management. Several examples of social and economic benefits are described below.

- **Public safety and climate adaptation:** Dams that have been abandoned or are unmaintained can pose a risk of failure, especially during flood events. Low head dams can also pose a significant hazard for boaters and swimmers. These risks can have resulted in property loss, injury and in some cases, loss of life. With a changing climate and an increase in extreme weather events, dam removal has been seen as a

the most economical option. A recent US study found that removal could be 10 to 30 times cheaper than ongoing maintenance and repair.

- **Cultural values:** Local communities and native people can have long-standing cultural and spiritual ties connected to individual free-flowing rivers, their features and the species that they support. Restoration through dam removal can provide significant, and in some cases irreplaceable, benefits in restoring these resources and connections to communities. Examples of dam removals that had a significant cultural benefit include, Glines Canyon Dam, Elwha River, Oregon; Veazie and Great Works Dams, Penobscot River Restoration Project, Maine.
- **Transition to lower cost, lower impact renewable electricity:**Older hydroelectric dams were often sited and constructed to support a specific mill or factory. Many of these mills and factories have since closed, and the capacity of the stranded energy to the electricity grid may be more effectively supplied by a lower cost, lower impact renewable energy source like wind or solar. Overall, with the significant drops in the cost of deploying wind, solar and battery technologies, a global study by TNC and WWF highlights the shifting role of hydroelectricity in meeting our clean energy needs, citing the global technical potential of low-impact wind and solar is 17 times the renewable energy targets under the Paris Climate Agreement.

> *To restore and protect the Elwha River for current and future generations, economists found that the public would be willing to pay $4.8B euros.*

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to remove the dams and restore the river. Several similarly designed studies have documented the substantial value that people place on the following environmental changes associated with removing dams:

- The existence of a free-flowing river that individuals can see now, in the future, or for future generations
- Knowledge that endangered species are present in a river and their population is recovering
- Improved catch rates for recreational anglers
- Improved experiences for whitewater boaters



FLY FISHING ON THE SAVINJA Barrier removal projects can help increase the catch rate for recreational anglers, like this one on the Savinja River in Slovenia. © Creative Commons

- **Recreational angling and commercial fisheries:** For projects that improve habitat for valued recreational or commercial fish, like trout, salmon, river herring, etc., measurable economic benefits have included improved catch rates, improved experiences, increase in jobs and revenue (increased visiting anglers). Two examples:

    - The Sea Trout Funen Project in Denmark generates an estimated $5.8 M EUR/year in angling tourism for a $.5M EUR/year initial investment in river restoration through dam removal.
    - In the State of Maine, USA, the restoration of rivers has resulted in fish harvesting permit sales to towns exceeding $600,000 EUR/year (Maine

most important fishery is another searun fish, the juvenile (elver) American eel (>$18M EUR in 2019: Maine DMR).

- **River recreation and other tourism:** Returning rivers to a free-flowing state can support new canoeing, boating and whitewater rafting opportunities. An increase in boaters can benefit neighboring communities when visitors support guide companies, restaurants, lodging and other establishments. For example, after the restoration of the lower Penobscot River the city of Bangor hosted the North America Whitewater Regatta for the first time and remained the host for three years in a row, bringing significant tourism and related revenues to the region.
- **Restoration economy – job creation:** Dam removal projects are infrastructure projects, and as such require the labor and services of engineering and construction professionals. This value has rarely been quantified but two examples from the United States demonstrate the tangible economic benefit and justification for further concentrated research.

    - In the state of Massachusetts, for every $900K EUR spent on restoration projects, 10 to 13 jobs were created or maintained
    - In the state of Oregon, 15 to 23 new jobs were created for every for every $900K EUR spent on watershed restoration, this also resulted in and $1.9-2.0M EUR in economic activity

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3. Project Phases



CUDDEBACKVILLE DAM Photo of the dam prior to its 2004 demolition on the Neversink River at Cuddebackville, New York. © Mark Godfrey/TNC

With so many dams and possible projects on rivers, how to start can feel like a challenge. There are a series of tasks that must be accomplished to take a project from an idea through design and ultimately construction for restoration. While each project is unique, generally, most projects require similar phases and considerations as outlined below and then further described in the following sections.

Project Planning and Assessment	Design and Permitting	Construction
Project identification. Partner development. Define project goals. Scope feasibility.	Field surveys and studies. Engineering design. Permitting review iterative with the design.	Hiring and working with a construction contractor. Determine partner roles.
Cross-cutting: Monitoring and Communication		
Determine best methods for outreach and communication with the community and partners. Develop pre and post restoration monitoring goals iterative with the project goals, designs, and permitting.		

Project Planning and Assessment

DEFINING PROJECT GOALS, PRIORITIZATION CONSIDERATIONS

ermine goals for all project partners at the beginning of a project. Fish passage, healthy er quality, improved safety, and reduced maintenance may all be part of the suite of

project will improve river habitat to different degrees depending on the scale of the impact. Where we work and how we spend limit resource dollars increasingly calls for us to be strategic when choosing which projects to move forward.

Many governments and nonprofits now have decision-support or prioritization tools available to estimate the relative benefits of a potential project. Common prioritization metrics for ecological restoration include projects that connect a high number of river miles in areas with good habitat and projects that will that will improve water quality.

Often these decision-support or prioritization tools are developed at a watershed or basin scale. By working at a watershed scale, agencies and partners can identify multiple projects that may advance established goals to restore rare or important riverine species.

In these cases, possibly several removals together will create a large network and could have a greater impact that one project alone or projects across multiple watersheds.

Please see the Resources section for example approaches to barrier prioritization and watershed scale restoration.

DEVELOPING A TEAM. WHO DOES WHAT WORK?

Developing a strong project team can be very helpful for some projects, particularly when managing more complex issues and multiple objectives. Even so it is good to determine who is the central project manager and how partners are each contributing.

If agency personnel are able, it can be beneficial to have them on the partner team to help access with data collection or assist with early review of designs and the permitting process. This does not need to be a formal or written structure, but questions to consider include:

- What is the role of agencies and NGO partners?

4. Who will be responsible for fundraising?

Different project phases will require different expertise, including biologists for survey, environmental and structural engineering firms for design, historic specialists, and permit specialists. The project team members may be able to complete some of these tasks.

For instance, state biologists may already have species information or are able to do the necessary biological inventory. Similarly, someone on the team may have experience with completing and submitting permits.

Project considerations

OWNERSHIP

Permission to remove a dam is a critical early step. Dams may be owned by the government, businesses, nonprofit organizations or individuals. Determine who owns the dam and what their long-term interests are in the dam and the associated uses of the impoundment.

Dam owners often have concerns and need design answers before they are able to decide. In such a case it is not uncommon to do a certain level of research or limited analysis to help answer some of these questions or agree that the design will meet a certain set of criteria.

For instance, that a drinking water intake that relies on the depth of the impoundment will be replaced with an alternative. When actively developing designs for a project, it is important to have agreement with the dam owner for removal and restoration before investing a lot time and resources.

SITE ASSESSMENT

Issues to look for include size of the dam, width of the impoundment relative to the river, existing uses (hydropower, water supply, recreation, etc.), adjacent infrastructure (roads, bridges, walls), upstream land use, sediment, visible bedrock, and more.

A sample site assessment to understand the potential complexity of a project is also included under the Resources section.

EXISTING USE

Every dam removal will change the area upstream and to varying extents the area downstream of the dam. Determining the existing uses of the dam and the impoundment are important to understand what uses may be affected and how that will impact the design.

In many cases, the existing uses will not all go away or can be mitigated for in the design. For instance, a pond that is used for fire suppression could be replaced by an in-river hydrant. In a well-known case in the United States, active hydroelectric dams were removed on the mainstem Penobscot River in exchange for the ability to install increased power capacity at dams on a tributary.

Local connections to the dam or impoundment go beyond commercial uses. Members of the community may feel a strong emotional connection tied to existing uses for recreation, scenery, or history. This fear of change can be a difficult hurdle to overcome and we discuss it further below when assessing key issues in your design and the importance of pro-active and consistent communication throughout the project phases.

Key issues to consider in assessing project scope and feasibility and defining project stakeholders

The top issues that are most likely to drive the complexity of a project are existing infrastructure, sediment quantity and quality, and ecological sensitivity, so we touch on those first. Case studies that illustrate complex and straightforward projects are included in the Case Studies section.

INFRASTRUCTURE/UTILITIES

It is critical to the design and construction of any dam removal to avoid impacts to human health and safety. Identify any infrastructure adjacent to, or within the limits of impact of your project early in the project.

This includes bridges upstream and downstream of the dam, roads or walls along the river, and water or sewer pipes under the stream bed or in the adjacent river bank. Not all infrastructure will be affected by the removal, but you want to determine this in advance and plan for it.

Often bridges or pipes were installed without considering that the dam and impoundment may not always be in place. Rivers are dynamic and can shift course from floods. In some cases, relocating a water pipe will be the best long-term solution. Adding scour protection to an existing bridge may be enough to protect from changes that might otherwise undermine a bridge pier or abutment.

SEDIMENT QUANTITY AND QUALITY

Sediment type, quality, and quantity play a large role in project design. In recent years, resource agencies and the dam removal community have come to better recognize that rivers naturally move sediment and nutrients every day, and even more so during high flow ts. Sediment is a natural component of the system.



K NAI, conservationists gather mud in sieves and rinse away the sediment to collect wildlife such as worms, shrimp and crabs. The creatures are taken to HKU's scientific laboratories © Lori CHeung/TNC

Sediment that is contaminated with high levels of pollutants that can impact human health may need to be removed and relocated to an approved off-site location.

It is important to note that not all dams accumulate sediment, not all sediment in the impoundment will move, and even then, not all at once. As a general rule a wide impoundment with a small stream will have less sediment erosion than a narrow impoundment.

Sediment, particularly sand and gravel, can be beneficial for rebuilding downstream gravel beds and creating habitat, as well as rebuilding estuary habitats and salt marshes farther downstream. Therefore, some projects allow for a natural release of sediment that will gradually move downstream and ultimately be replenished from upstream through restored river function after the dam is removed.

The Ennerdale Weir and the Retuerta Dam removals illustrate two different approaches to managing sediment benefits and impacts. See also the Additional Resources section for links to an example of published sediment guidelines from the US Bureau of Reclamation.

ECOLOGICAL SENSITIVITY

Dam removal will fundamentally change the habitat type and construction activities inherently have some impacts. The fish, wildlife, and plants that are in the impoundment will be impacted as the dam is removed and the water recedes.

It is important to recognize this and know that there will likely be a loss of plants and animals with low mobility (like mussels). You cannot avoid all impacts to all individuals or species, but there are best practices that can be implemented to minimize these impacts.

Work with your natural resource agencies to determine particular species that are threatened or endangered which could be impacted in the short or long term. In other

minimize those impacts.

Planning for species impacts could include adjusting the time of year construction takes place, implementing certain measures during construction to avoid impacting the species, or adding habitat features to the design to benefit critical species. Some examples are below.

Construction timing: Avoiding impacts

- Biologists may want to avoid construction during the migratory season for fish. Thus, the construction can be timed to start after migration.
- Avoid nesting and spawning season for a particular species, or have a biologist identify specific sites to be avoided or protected during construction.

Pre-construction methods: Minimizing impacts

- Biologists may be able to collect and relocate individuals from the impoundment before construction starts. For example: electro-shocking fish or hand collection of mussels during a controlled draw down of the water level.
- Installing barriers to prevent species from moving into the construction site. For example, a barrier can be put in place around the site to prevent wildlife, like turtles, from entering the construction zone and being injured by moving equipment.

Improving Habitat: Mitigation for impacts

- Native plants can be added to kick start a restoration, such as trees to add shade to reduce water temperature
- Habitat features could be added for sensitive species that may be impacted. An example of this could include keeping trees removed during construction on site an...

In the Ennerdale Weir removal case study, protected fresh-water mussels were both a target species that benefit from the removal, as well as a sensitive species requiring special sediment management measures during construction.



ED BILLS POND DAM REMOVAL, USA Volunteers work to plant the former impounded area following a dam removal on the Eight Mile River. © TNC

additional public outreach to prepare people for the change and provide examples from other projects.

Public outreach can be supported by developing design schematics, photo simulations, or illustrations of the site before and after removal. Examples from other dam removal and restoration sites are also useful. These types of public sites may also warrant consideration for additional planting to kick start some of the natural regrowth.

The impact on steeper gradient streams with narrower impoundments will likely be less visually dramatic and therefore less challenging for the public.

RECREATION AND COMMUNITY ACCESS

As the river changes, types of recreation can change. Talk with the community about what concerns they have. Sometimes a drained impoundment can have walking paths built or benches and interpretive signs added at overlooks. Fishing access or new boating access can also help people enjoy the new river. In some cases, dam removal creates new white-water recreation opportunities.



FREE-FLOWING KENNEBEC Paddlers enjoy a stretch of the Kennebec River that has been free-flowing since removal of the Edwards Dam. © Tim Paul / TNC

HISTORIC

Many dams were built decades to hundreds of years ago and may have significant cultural and historic significance. Removing a dam could have an impact on these values. Identify the local and country laws around these impacts. In many cases the impact cannot be avoided, if the dam itself is the critical feature. Photo documentation of the dam before and during removal can provide insight into the architectural and engineering history of the dam. Interpretive signs can serve as a marker and educate the public of the past significance of the site after the project is complete.

FLOODING AND FLOOD CONTROL

ple often have concerns about how dam removal will affect flooding. This stems in part from the perception that all dams provide flood control, when in fact very few actually do.

your communication with the dam owner and the public.

Design and Permitting

Once you have selected a project and understand the key issues, you will need to develop design plans to complete the restoration. The complexity of the project will determine what types of engineering and biological studies are necessary and how detailed the plans need to be.

Sustainable Restoration Project Design

Design should address the previously discussed issues through the project planning and site assessment, as well as those identified by the owner, partners and agencies. Keep in mind that not all projects need to design for, or consider, all issues.

Restoration projects should be designed to meet ecological goals and match the situational context, while maintaining health and safety of the community. Consider the following three keys when approaching your project design.

1. **Simple vs. Complex projects.** Projects will need a different level of design and analysis depending on the issues at the site and the surrounding context. For instance, a project in the middle of a city with adjacent water pipes and a high volume of potentially contaminated sediment will require greater study and likely a more complex design than a project on a bedrock dominated stream in a natural area.
2. **Removal for restoration.** In order to restore river function and processes any dam removal should always remove the full vertical extentof the dam and as much of the

and the scour the riverbed as well as limit fish passage.

3. **Passive vs. Active Restoration.** Given the dynamic nature of rivers, less is often more when it comes to river restoration. Understand the project goals and determine how best to meet those through the design process. Passive restoration recognizes that the site will adjust over time and minimizes in-channel work, focusing on full removalof the dam and allowing for the river to self-adjust. Active restoration may be more appropriate in a case where infrastructure and sediment management require some direct channel reconstruction, or installation of infrastructure protection measures.

HIRING THE RIGHT EXPERTISE

Many projects will require design by a certified engineer. Often this will include someone or a firm with experience that includes hydrologists and structural engineers. You'll want to find someone with experience working in river systems.

Dam removal is a relatively new field, so not all engineers may have designed a removal, but identify engineers with experience in rivers, including dam building or bridge design. Both types of projects that require similar types of analysis involved with dam removal.

Also consider including a fluvial geomorphologist on your team, a scientist who understands how flow and velocities influences river structure and habitat. Especially if others on your team don't have prior experience working on river restoration projects, it is important to have someone with expertise in river form and function reviewing the design.

BASIC COMPONENTS OF A PROJECT DESIGN

design and summarizes the analysis that went into the design. The memo can also be used to layout alternatives analysis if that was part of the process.

Design sheets: The detail of your engineering design will depend on the complexity of your project and your permitting requirements. In general project plans will lay out a site base map with existing conditions and natural resource areas, equipment access, the sequence of removal construction, extent of natural resources impacted, and proposed final conditions. Design plans typically present a profile view of the stream channel as well as existing and proposed cross-sections of the river channel. You may also need to provide detailed information on particular activities such as how you will manage dewatering, sediment management, or restoration plantings.

Cost Estimate: Once you have a design, you'll be able to determine estimate. Working with an engineer they are able to estimate costs before you look for a construction firm to complete the work.

PERMITS

Contact your regulatory agencies to determine what permits the project will require, including the timelines and agency personnel contacts for each permit. Typical permits can be from separate local and state authorities and may relate to potential impacts to wetlands or stream, species specific impacts, dam specific issues, or building and demolition issues.

Rather than wait until the design is complete, it is often useful to initiate project discussions with the permitting agencies early in the design process so that designs may be adjusted to best avoid impacts and account for resource concerns. This iterative process can save time and money and often delivers a better restoration result.



CUDDEBACKVILLE DAM, NEW YORK Start of breach during demolition of the Cuddebackville dam on the Neversink River at Cuddebackville, New York in September, 2004. © George Schuler/TNC

CONSTRUCTION APPROACHES

How you approach construction will be somewhat determined by design issues such as your sediment management plan and avoiding sensitive species impacts, and site issues, such as if you are able to draw down the water levels in the impoundment in advance.

river around the construction site. Building and maintaining water diversion will extend the construction time and increase costs, but there are often reasons that this is right approach, for instance when building in the river.

In the case of in-river work, it is allowable for the equipment be in the river up to a certain safe depth, usually with a requirement for biodegradable hydraulic fluid. This works better in cobble and bedrock streams where there is less risk of heavy equipment sinking into soft sediment.

WORKING WITH A CONTRACTOR

Determine how to move forward with construction and bring in the right expertise to fit the project. More complex projects may require hiring a construction firm with significant structural building experience.

Regardless of the complexity of the project, look for firms with experience working in water, particularly in rivers. These types of firms will know how to watch and manage for rain events and will have operators comfortable working in wet environments. Many of these firms are also often able to suggest construction approaches that save time and money.

Determine who from your team, partners or the engineering design firm will be on site to help direct the contractor. You should consider having the design engineer on site for phases that include technical issues such as complex water management or building infrastructure protection measures or a rock riffle. Having the design engineer on site also ensures they are liable for their designs if they oversee installation.



ROB BULLARD AT DAM REMOVAL Rob Bullard, Tennessee River and Cumberland River Program Director for The Nature Conservancy in Tennessee, was on the scene as the Roaring River Dam was being removed. © Cory Holliday/The Nature Conservancy



ROARING RIVER DAM DIGGING OUT A power shovel tears away the old deteriorating dam on Tennessee's Roaring River. © Paul Kingsbury/The Nature Conservancy

SAFETY

Always develop and follow a safety plan both for the safety of the contractors and for the partners and visitors to the site. Common elements include restricting public access with posted signs, wearing safety vests and hard hats, requiring visitors to check in when arriving on site, and posting proper signs to direct traffic.

CROSS-CUTTING

MONITORING

We learn from our successes and our challenges with each project and the right monitoring contributes to our understanding of river restoration techniques. Partners should determine what metrics should be monitored as not all projects necessarily warrant the same level of monitoring.

Often funders require monitoring of one or two factors to ensure the project met the funding goal. For instance, evidence that migratory fish are using the site and continuing upstream following restoration, or improvements in water quality and temperature.

In other cases, partners have reason to complete a longer and more comprehensive study to include physical and biological metrics such as plant communities, fish and wildlife presence, substrate type, water quality, and more. For most projects, you'll want to determine an appropriate time span, including sufficient pre and post restoration data collection.

Examples of monitoring protocols are included in the Resources section below.

FUNDING

Funding is always a big question with any project. Based on your project goals and the types of benefits you may be eligible for different types of funding.

Determine what species will benefit from your restoration, including metrics like how many miles of habitat will be accessible. Projects that benefit migratory species are often easier to fund, but funding is available for native species as well.

Also look into infrastructure funding, considering that removing aging infrastructure ha a ic safety benefit and reduces future maintenance costs. When developing a budget for

COMMUNICATION AND STAKEHOLDER ENGAGEMENT

Clear, proactive, and consistent communication with the stakeholders interested in the current and future condition of the river may be necessary across all phases of a project from planning through construction and post-construction monitoring.

Depending on the complexity of the project, this may include a combination of announcements in local newspapers, community forums or social media, public meetings and an accountable and accessible point of contact for stakeholders to reach with any questions or concerns.

Some smaller projects with fewer noticeable changes may not require the same intensity of outreach. Communicate the anticipated benefits of the project, any anticipated negative impacts, and a plan to manage those impacts. Often, an illustration of the site before and after construction, can help with communication.

BACK TO TOP

4. Overview of Financing Options



WATERFALLS OF THE UNA RIVER The Štrbački buk waterfalls and the the Una River forms a natural border between Croatia and Bosnia-Herzegovina. © Ken Geiger/TNC

Ideally, when a dam is no longer serving its intended purpose, or when its value is outweighed by the social or environmental costs, the owner would be responsible for, and able to, finance removal of their infrastructure.

Today, for many reasons, this is rarely the case. Over decades, and in some cases centuries, dams can change owners multiple times, or they can be abandoned altogether. In addition, historically, the life-cycle costs of a dam, including the cost of removing infrastructure, has not been factored into the business model.

Many local and national governments, including many countries in Europe and in the U.S., lack proper regulatory frameworks and funding mechanisms to address the public safety issues associated with maintenance and removal of unsafe dams.

Existing Funding Mechanisms

By understanding the many potential benefits the project may provide – for people and nature – in addition to your specific objectives, you can maximize the potential for community and financial support.

These benefits may include climate adaptation and public safety, water quality, recreation, water supply, biodiversity, migratory fish and the environment. In general, sources can be separated into public and private funding.

One source of funding may be adequate to finance a small, low-controversy project – while large, and more complex projects may require two or more sources of funding.

Public funding sources used in European countries include:

EUROPEAN UNION

- The Cohesion Fund: This fund allocates € 63.4 billion to trans-European transportation and environmental projects, aiming to reduce economic and social disparity and promote sustainable development. In candidate countries it has been used to support dozens of dam removal projects. Notably, the Estonian Government successfully leveraged use of the Cohesion Fund to finance 85% of a €15 M basin-scale restoration project in the Parnü River Basin including eight dam removals on the mainstem and tributaries. The remaining 15% was provided by the Estonian state budget. Key to using this fund was the development of a River Basin Management Plan that identifies the needs and priorities for dam removal consistent with implementation of the Water Framework Directive.

European Commission LIFE Environment subprogram. The goal of the environment subprogram is to fund nature conservation projects with a focus on the areas of biodiversity, habitats and species, so long as more than half of the project costs are used to improve conservation status of priority habitats or species listed in the EU's birds and habitats directives. Otherwise, general nature conservation projects may receive co-financing of up to 60%. *Example: Yecla de Yeltes Dam, Huebra River, Spain incudes a Natura 2000 site and was therefore eligible for LIFE funding.*

LOCAL AND NATIONAL GOVERNMENTS

- Municipalities and Water Authorities may have the resources and jurisdiction to purchase and remove obsolete dams. *Example: In Sweden, Hudiksvall Municipality, purchased and removed Sofieholm's hydroelectric power station. In France, water authorities may subsidize a portion of removal costs.*
- Project funding has been provided through national agencies including national park authorities, environmental agencies, and marine and fisheries management agencies in countries including France, U.K., Estonia, Sweden, Switzerland, Spain, Finland and Germany have funded projects. For example, in 2019, the Finnish Government announced they would allocate $18M EUR to increase funding for restoring migratory fish through barrier removal and restoration of breeding grounds.

Private funding opportunities may include:

FOUNDATIONS AND PRIVATE DONORS

- Removing an obstacle from a river and returning it to its free-flowing state is something that can be seen as a direct legacy for donors. The one-time investment

- Europe is a global leader on funding barrier removal through crowdsourcing. Led by the efforts of WWF Netherlands, they have facilitated raising tens of thousands of EURs to date, removing barriers in the Ukraine and the U.K., with more in the cue. Learn more about their Dam Removal Funding Platform here.

NON-GOVERNMENTAL ORGANIZATIONS

- Local, national and global environmental and river conservation organizations
- Angler's associations (Association of Anglers for the Conservation of Rivers, European Anglers Alliance). On the River Dove in England, local fishing clubs helped to fund and manage dozens of weir removal projects.
- Whitewater and paddling associations



KRUPA RIVER, CROATIA The winding Krupa River makes its way through Croatia. © TNC/Chip Carroon

funding streams.

1. LIFE-CYCLE FINANCE MODELS

With a better understanding of the full life cycle cost of dams, lenders and governments can make project financing and permitting contingent on a commitment to incorporate the true cost of the project, from cradle to grave, into the business model.

This would include the project owner guaranteeing financial reserves for the removal. In a setting where the cumulative social and environmental impacts of existing dams is already high, these reserves may be used to establish a revolving fund where the cost of removal of the newly financed or permitted project is used in the near-term to remove existing high priority dams that no longer serve their intended purpose.

2. CLIMATE ADAPTATION AND PUBLIC SAFETY

As our climate changes, flood and drought events will continue to become more extreme. Strategic barrier removal can be incorporated into local and national climate adaptation strategies to reduce the community risks of failure during a flood event or exacerbating critical water quality conditions during dry seasons or drought events.

This is also a measure to support adaptation of ecosystems by increasing river connectivity and resilience. In Massachusetts, there are several state-level programs that can serve as models for how to include dam removal finance in a public safety and climate resilience strategy.

Three examples include:



- Municipal Vulnerability Preparedness (MVP) Program Action Grants. TNC worked with the state to develop a vulnerability and climate adaptation rapid planning process for municipalities. After completing a MVP plan, municipalities are eligible to apply for Action Grants to implement their plans. Ecological restoration, including dam removal, is an eligible activity.
- State Hazard Mitigation and Climate Adaptation Plan (SHMCAP). Using a collaborative stakeholder process, Massachusetts recently released a statewide climate adaptation plan to promote resilience of state agency operations, assets and resources. Dam removal is a key adaptation tool referenced in the newly released plan and draft legislation is being proposed to fund implementation.

3. ENVIRONMENTAL MARKETS FOR DAM REMOVAL

An environmental market is an exchange-based approach that uses market mechanisms to achieve environmental goals (regulatory and non-regulatory). Below, we outline two types of environmental markets emerging for dam removal; compensatory mitigation and ecosystem service markets.

Compensatory mitigation. The first is based on the opportunity to use dam removal as a mitigation tool for unavoidable environmental impacts as required by regional or national environmental regulations. For example, in 2018 the Sihlpost Dam was removed in Sweden as mitigation to offset river impacts from a railway expansion.

A recent Nature Conservancy study highlights example crediting mechanisms for dam removal and offers recommendations to increase the use of dam removal as a mitigation tool in the U.S.

Water Act.

In Europe, environmental regulations and mitigation requirements vary from country to country, however three general regulatory frameworks may readily support markets for barrier removal:

- *Biodiversity offsets*—where new development is negatively impacting river habitat, and offsets are required, dam removal can be a durable river restoration tool to create habitat for critical species and populations – in particular, for migratory and resident fish, freshwater mussels and other macroinvertebrates and, potentially for riverine-dependent plants, birds and mammals. Regulatory frameworks that may support biodiversity markets include Natura 2000, European Commission Eel Regulation and National Eel Management Plans, and country-or regional fish passage regulations.
- *Concessions/permits for water use or hydropower*—where regulatory requirements are in place and enforced, strategic dam removal can be a mitigation tool for renewing existing hydropower and/or water use concessions or potentially for considering new ones.
- *Water Framework Directive*—several dam removal projects have demonstrated the ability to improve ecological status to meet the goals of the water framework directive. Similar to biodiversity offsets, where existing or new developments are seeking opportunities to mitigate their impacts to a stream's condition and status under the Water Framework Directive, dam removal may be used as a mitigation tool (see benefits).

In the U.S., formalized environmental mitigation markets have been demonstrated to reduce permitting times by half, can make more effective conservation investments

Targeted ecosystem service restoration.

A second type of market may be created by the restoration of a specific ecosystem service. Simply put, a service provider pays for the dam removal to improve the provision of its services.

For example, dam removals have been demonstrated to improve water chemistry (DO, temperature) and reduce the risk of algal blooms. A water utility may pay for the removal of an obsolete dam upstream of its intake, in order to improve source water quality and reduce treatment costs.

Dam removals have also been demonstrated to drastically improved recreation and fishing opportunities. In these cases, an angler's association group may pay to remove a dam in exchange for the benefit of the fisheries or in exchange for an extension of the region for which it manages permitting authority.

4. LEVERAGING ECONOMIES OF SCALE

Governments, NGOs and private investors have found ways to drastically reduce the project costs of dam removal by both, vertically integrating project phases and by implementing multiple projects at the same time.

For example, there is a federal team in the U.S. Fish and Wildlife Service that is trained in the design, permitting, project management and construction of dam removal projects. This team specialization has dramatically reduced the overall cost of project implementation and could potentially be replicated by a government agency or NGO in Europe.

Similarly, government agencies and NGOs that are moving forward with several dam ovals at the same time may issue a request for proposal on a comprehensive service

5. Case Studies

The following case studies present in brief three dam removal projects which illustrate success managing some of the key issues at restoration projects.



Retuerta Dam, Spain

Removal of the Retuerta Dam is restoring fisheries and natural river processes in the Aravelle River in the municipality of Umbrías, Spain. **Read the case study.**



Ennerdale Mill Weir

The Ennerdale Mill Weir removal is an example of a successful project that was accomplished with limited complexities. **Read the case study.**



Vezins Dam Removal

6. Resources



UNA RIVER, BOSNIA The Una River flowing through Bosnia. The river forms a natural border between Croatia and Bosnia-Herzegovina. © Ken Geiger/TNC

Ecological and Socioeconomic Benefits of Dam Removal +

Regional Barrier Prioritization Tools, Project Databases and Studies +

Authors and contributors

Content written and edited by Tara Moberg and Amy Singler with thanks to our partners at Dam Removal Europe, Rewilding Europe, WWF Netherlands, and the Massachusetts Division of Ecological Restoration for sharing their experience, review and contributions to the case studies and financing sections.

Questions, comments or suggestions on the above content can be emailed to Tara Moberg at tmoberg@tnc.org.

Acknowledgements

The Nature Conservancy is fortunate to have the support of visionary people and organizations, whose generosity allows us to pursue our mission. We are grateful to the Enterprise Rent-A-Car Foundation for supporting our work to find water solutions that work for rivers and the communities that depend on them.

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Attachment 3
Source: https://www.nyclimateexchange.org/blog/project-closed-circuit-helping-cities-lead-on-ev-battery-circularity

Project Closed Circuit: Helping Cities Lead on EV Battery Circularity

Apr 10

The New York Climate Exchange recently launched ***Project Closed Circuit***, a new project to put cities at the center of electric vehicle (EV) battery circularity.

What is EV Battery Circularity?

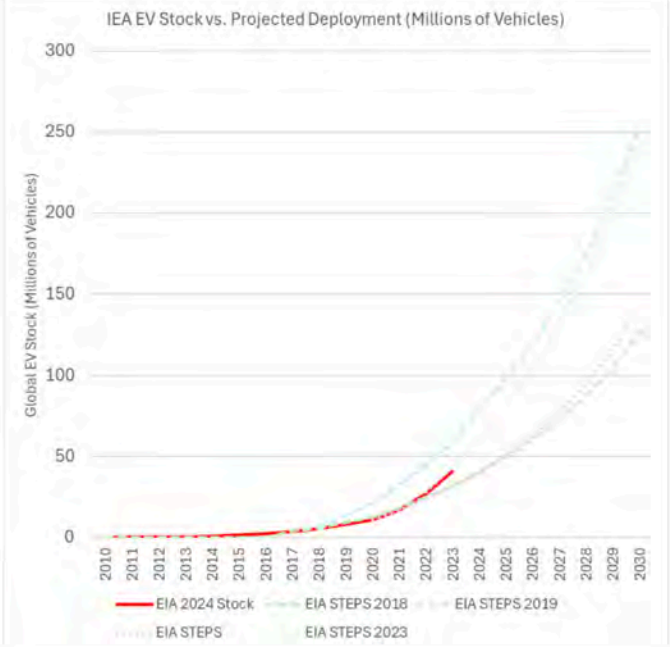


Figure: Global EV Stock vs. forecasted demand (2018-2023 forecasts, 2024 actual)

Batteries are at the heart of the effort to electrify the economy and move away from fossil fuels. From powering EVs to storing electricity generated by wind and solar, global battery demand has surged by around 33% per year over the past 30 years. Nearly 95% of recent growth is driven by EVs. In 2013, there were only 100,000 electric vehicles on the road worldwide; just 10 years later that number reached 40 million!

The transition to EVs comes with challenges.

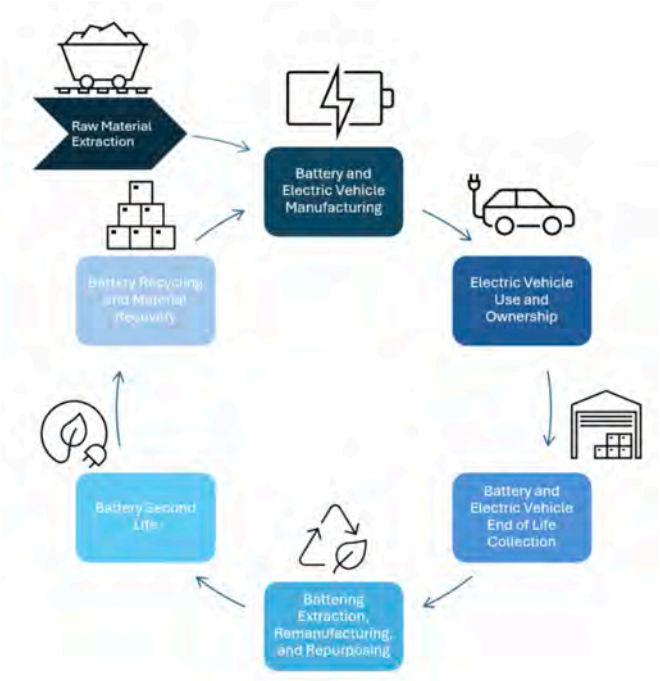
[International Energy Agency, Annual Energy Outlooks 2018-2024]

All batteries require rare earth materials—85% of the world's lithium, 70% of its cobalt, and 10% of its nickel go to battery production—and we'll need hundreds of new mines to meet growing demand. Many of these mines come with environmental and human rights concerns and increase the world's dependence on unstable supply zones.

Still, EVs are much less harmful to the environment than gas-powered vehicles, however high upfront costs and questions about battery life contributes to slow adoption. Like cell phones, EV batteries degrade over time. Around 7-12 years into an EV battery's life, it loses about 25% of its original strength. At this stage, the battery may struggle to maintain peak performance, despite having 70-80% of its charging capacity.

Disposing these batteries in landfills risks contamination from toxic materials and recycling them prematurely wastes their remaining value. **A single-use EV battery is unsustainable.** Without a better way recycle and repurpose batteries, the growing EV market could turn a climate solution into an environmental crisis.

A "circular" approach offers a sustainable solution and massive market opportunity.



A circular strategy maximizes a vehicle's lifecycle using intelligent battery management. This first stage involves using data to optimize battery performance so it can be used longer before being discarded.

Once a battery's charging capacity degrades to 70-80%, it can be reused or repurposed. These second-life batteries can be used in building energy systems or electrical grid storage. This approach transforms a battery, once considered garbage, into a valuable asset, and allows EV owners to earn money from their used batteries. These circular

Figure: A Circular Economy for EV Batteries. Credit: Wyatt Williams

economy principles make EV ownership more affordable and environmentally responsible.

Finally, at the end of its life, the battery can be recycled. Recycling processes extract and purify raw materials and send them back to manufacturers for new batteries. This closed-loop approach dramatically reduces the need to mine new materials, creating a sustainable cycle that minimizes waste and environmental impact.

Current estimates value the battery circularity market to be $7 billion by 2033. According to The International Energy Agency, battery circularity could decrease the need for critical mineral mining by up to 40% and decrease greenhouse gas emissions by up to 80%. EV batteries that are suitable for second-life applications could create more than 200 GWh of power—enough energy to power around 18,500 American homes for a year—by 2030 Plus, local circular economies for batteries reduce dependence on foreign sources of raw materials

Cities are already at the forefront of the battery revolution: they are home to the majority of EV fleets and owners, charging infrastructure, and the bulk of the growth in energy storage systems – making them ideal innovation grounds for battery circularity. This deployment ecosystem means the potential for demonstrating battery *circularity* is at our fingertips. It just needs some support and coordination.

Introducing *Project Closed Circuit:* at the heart of battery circularity.

Project Closed Circuit leverages The New York Climate Exchange's partner network of battery experts and resources, business and public–sector engagement, convening, and thought leadership to deliver:

- Framing and analytical content
- Key industry events that facilitate learning and collaboration
- Technology and regulation across and beyond our partners to advance a circular economy for batteries

What will this look like?

- **Awareness**: Expanding the network of individuals who are advancing battery circularity by sharing its importance with new audiences — from city officials to fleet operators, waste management professionals to insurers and financiers, and national security and supply chain logisticians to sustainability advocates.
- **Urban Solutions**: Developing communities of practice across and beyond the Exchange's partner network to ensure that local lessons from the battery ecosystem extend across geographies. These convenings will focus on researchers, city officials, regulators, startups and private sector businesses, fleets, and energy system developers.
- **Implementation**: *Project Closed Circuit* will initially focus on The Exchange's home — New York City. With a regulatory and economic framework that informs cities worldwide, NYC is poised to become a leading hub and global model for resource-efficient battery innovation, investment, and safe deployment. This will be achieved through policy, local access to battery data and end-of-life battery assets, and the development of a replicable roadmap for battery circularity in urban environments.

Want to learn more, get involved in, or receive updates about this project and its events?
Email us at batteries@nyclimateexchange.org with the subject line "Project Closed Circuit".

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SPRINGER, CHARLES

From: Chris Ganiere <zeist19@gmail.com>
Sent: Tuesday, August 4, 2026 10:08 PM
To: sustainability
Subject: CAAP

Government is not equipped to deal with "Climate Change". Not Costa Mesa Government, not State of California Government. Not Federal Government hundreds of billions have been spent and yet the climate is exactly as destructive as before the money was spent.

The City of Costa Mesa is not required to help the Federal Government in any way because of the anti commandeering doctrine. We don;t have to spend a single City resource for FEDERAL goals.

Just take this document and file it away and say it is for the citizens & residents of Costa Mesa to decide to voluntarily do something. No enforcement. No record keeping. Just let the people do what they think is right.

Less Government = More Liberty = More Cash in the hands of the People.
Electrons from the mind of Christopher Ganiere

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SPRINGER, CHARLES

From: cheri messerli <scoutholiday@gmail.com>
Sent: Wednesday, August 5, 2026 12:51 PM
To: sustainability
Subject: Feedback on CAAP

Categories: CAAP

The City's Integrated Pest Management (IPM) Plan also ensures the health of Costa Mesa's ecosystems. Adopted in 2019, the IPM Plan prioritizes organic and least-toxic treatments, reduces fertilizer use, and focuses on prevention first. This balanced, eco-friendly approach protects community health, supports local ecosystems, and goes beyond the regulatory requirements of Federal, State, and Orange County agencies.

Then why was it ok for glyphosate to be sprayed in a park that is designated a nature preserve, within 500 ft or less of two schools currently in session, with guys spraying in full hazmat suits?
For some sort of wildflower project, or at least so I was told.

Get rid of grass, regulate how often grass only yards can be watered, get rid of grass in parks, kids don't need grass, they need nature to play in and explore. Other than sports fields, it is not needed, and drastically guzzles up too much of our water, which we are already going to have to use less of, Colorado river water rights are being renegotiated because it is does not have the water it once did, and too many people/states need it.

page 56, great! Please implement it. Trees need to be big to create shade, this take years, it needed to start years ago, but now it better than never.

You talk about fire hazards and risks of wildfires, but fireworks are STILL legal here, which is ridiculous. People are CONSTANTLY setting them off throughout the year, and on the 4th of July it is horrific how much pollution, and fire risk is going on. My street alone was nuts. The air quality index the day after is terrible.

p68 is suggestions to people, not noting any actions by the city, what is the city doing besides making these suggestions in this document?

p. 69 Unless the city is changing the codes so that new buildings need to implent these things, these are just suggestions, and not actions in any way. Update building codes, offer rebates for homes and businesses who upgrade to a grey water system. Promote Grey water systems… these are the only ways to get people to change, along with education on Why it Matters, Why it is DIRE.

A huge way to mitigate urban fires is to underground the old electrical lines, especially in Costa Mesa where they are old, and not properly maintained and often buzzing very loudly. Look at what happened with the Eaton fire. Put pressure on the companies who are not maintaining their lines. The consequences can be deadly and devastating.

p. 71 Host mending events, events teaching about composting in different ways, events teaching about reusing, and wasting less, buying less etc..

p.72 Information about how much gas leaf blowers pollute such as 1 hour of lawn mowing is the equivalent of a car driving 3,000 miles in emissions. Public education is key. Have this kind of information as visuals during city events, even if not related to the event, just as public service announcements, or as bus stop billboards, etc..

p. 73 Planting more trees is great, but please stop planting non native plants and trees that are highly flameable. Native plants use less water, survive the heat more easily, and are more fire resistant. We need oaks to be planted, maybe not along sidewalks as they get so large, but they are needed for survival of so many species. There is the Fairview nature preserve, please get some native oaks planted there. They are essential to our ecosystems.

Please host events where people can learn about natural pest control with things like neem oil. Where people can learn about amending their soil naturally, not with horrible chemical based products. Worm bins are a very easy low maintenance way people can amend their soil, and compost at the same time. Events where native plant landscapers can educate people on ways to make their gardens more water wise, save money, and be beautiful, as well as supporting local wildlife.

We need to be a sponge city, to mitigate flood risks, it would be great to work towards making it more of a 15 minute city as well, difficult in a suburban area, but still can have things implemented to help. Look up both terms if not familiar.

Look at what Paris did in a very short amount of time. The city's outgoing Mayor regreened the city by digging up paved areas and planting tons of trees, closed off streets to traffic to make them kids, families, walkers, bicyclists, put in more protected bike lanes, and drastically reduced air pollution.

Another idea is to have maps of all the great bike paths in the area for people to access online to encourage biking vs driving. Make Costa Mesa more bike safe and friendly.

One last note, please do a better job of adding signage that is CLEAR to educate the public in Fairview park, that they are in a delicate ecosystem. 90% of California's vernal pools have been destroyed, these ones in Fairview park are extremely important to protect. That information right there should be on signs in the park by each one. People and dogs are running through them, damaging those essential habitats. This has been captured on camera by the staff who maintain these grounds, which is where I learned this when I was volunteering with them. There needs to be a sign with some ordinance which would mean people would be fined for trespassing in these protected zones within the park. Otherwise, no one takes it seriously. The educational sign for it also matters, because many people probably have no idea what a vernal pool is or that is is an eco system in danger of being lost in California.

Happy to see the objectives on pages 81-83.

Please also prioritize the banning of all use of glyphosate, on both public lands and waterways, as well as on private property. It should be the number one priority. Be a leader in this respect. It only significantly increases fire risk, as well as cancer rates. The group of advocates known as OC Creek Team have brought to light the intense use of this horrific chemical in Orange County. Going against wildlife

protections, not to mention causing immense irreparable damage to soil, air, water, and human health. This should be priority number one for Costa Mesa, to eliminate its use entirely.

Also, stop spraying pesticides in the gutters on the streets of Costa Mesa. I was horrified to see a truck with a guy spraying out the window into the gutters all along the street. This is a backwards practice. No more spraying. It's lazy, it's toxic, it causes cancer, and is completely irresponsible. It goes against anything you're doing as a city to build a better safer, cleaner, sustainable environment. What goes into the soil, goes into the air, the water, and the people.

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From:	Dominic Bendinelli
To:	sustainability
Subject:	Draft CAAP Comments
Date:	Sunday, August 2, 2026 6:16:50 PM

The Costa Mesa draft Climate Action and Adaptation Plan is an excellent document. The team who crafted this has done amazing work and I look forward to the city adopting it. Below I have some suggestions on how (in my opinion) it could be improved even more.

A General Comment: The draft CAAP appears to be missing major milestone dates and metrics to measure against next to each Objective/Action. For example M1.B "Transition the City's non-emergency light-duty gasoline- and diesel-powered fleet to EV". The state of California is aiming for a fully electric state-owned fleet by 2030, are you planning to meet or beat that goal? Each of the Actions listed needs to have a complete by date projected. If you take a look at the Los Angeles or San Diego Climate Action Plans they have five year increments with targets set along each milestone. A closer to home and smaller city, Buena Park's CAAP has 2030 and 2045 targets set for each action. To be clear this plan has great goals, but it means nothing if in 15 years a resident stands up at council and asks why you haven't "Install solar PV systems as shade structures at City owned parking lots and facilities" (M2.E) and the council of this future says there is no obligation to do so since the timeline was undefined.

Comments by Objective:

TR1 - Consider incentives to auto dealers for selling electric vehicles over internal combustion engine vehicles. Potentially a local tax break on the purchase of EVs.

TR1 - The city should be exploring and favoring V2G capabilities especially when looking at medium and heavy-duty charging facilities which will tie into Objective E3.

TR1 - It could be considered parts of T1.C/T1.D/T1.E, but its vital that the city prioritizes access to EV chargers at multifamily residences where renters are often not able to have a choice in the right to charge their EV. If rules can be changed to require a minimum number of chargers via landlords or programs rolled out to use state funds to provide those, either way its a bottleneck that should be addressed sooner than later.

TR.1 - There should be explicit language for partnership with school districts for ZE school buses and infrastructure. (This is a very well known program, but this comment and my previous comment are inspired by this.)

TR2.A/B - Please stress the need for *protected* bike and pedestrian infastructure.

TR4 - Support efforts to revive the OC Centerline rail project or similar proposals that could connect Costa Mesa to the county and the LOSSAN corridor via heavy or light rail. Similarly consider studying a streetcar route like the OC Streetcar especially on existing ROW.

E3 - Consider adoption of policy that requires businesses with an excess of X number of parking spaces to develop solar canopy parking. For example, if a business has over 100 parking spots, 30% must be covered by solar canopy. Not only does it support the E3 measure, but also reduces dangerous heat island effects.

OR1 - Consider offering financial incentives (when funding available) to switch to ZE equipment and follow that up with non-voluntary restrictions on gas-powered lawn equipment such as neighboring Irvine.

NU1 - Include an action to maintain existing green space in the city and incorporate new green space if the opportunity presents itself.

NU1.C - Adopt a policy where a tree is planted in each parkway, unless explicitly rejected by homeowner. Public Works can go door to door with flyers/knocking in a neighborhood to notify residents they will be planting trees and give opportunity, with amply time, for rejection.

NU1.H - " Amend the municipal code to limit the removal of mature trees" add 'unless causing unavoidable property damage'

Great plan! Props to the whole team who worked on developing this and the Commissioners and Councilmembers supporting it!

Thank you,
Dominic Bendinelli

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From:	Eric Engle
To:	sustainability
Subject:	comment on the CM draft
Date:	Saturday, August 1, 2026 11:55:44 PM

Hello, would it be better if more people took alternative transportation option besides just using electric cars because it wouldn't solve the over-reliance on the cars (gas or electric) throughout the city. The best way to reduce emissions is to provide viable alternative like the cool bike lines going around town. its a start. I feel The city needs a dedicated bus route that loops around within the city limits on a 10-15 minute frequency to the cities biggest destination hotspots. The Goat service is nice until the wait times are over an hour. wouldn't it be nice to have some kind of high capacity vehicle performing the service. Thanks

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SPRINGER, CHARLES

From: Jeff Gibbs <jginnb@gmail.com>
Sent: Monday, August 3, 2026 6:21 PM
To: sustainability
Subject: Smart Traffic???

I reviewed the document and noticed not a single comment about smart traffic. Lot's of info about pedestrian paths, bicycle paths, electric vehicles, though not a mention about keeping traffic moving. Idling cars are terrible for the air, and as long as we keep putting in stop lights, taking away lanes, traffic is going to idle more and more. And reducing speed for potholes and speed bumps, cannot be good either, as most of the time, cars accelerate away from them. My suggestion is to hire a traffic engineering department, to keep the major streets moving, such as Fairview, Harbor, Placentia, Adams, Victoria, 17th, 19th and other major thoroughfares. Keeping traffic moving alone would help the air, not to mention city workers would become more efficient. If the city has a traffic engineering department, tasked to help residents move safely, then I am not aware of that, and perhaps should replace them with participants from the Early Childhood Program. My guess is the results would be identical, traffic stopped throughout the city.

The other item that must be looked at to keep traffic moving, is the 55. How does that highway end at 19th street? Figure out how to get it to Newport, and make it our neighbors problem, or, get revenue from Newport for all of the idling vehicles.

We also have a lot of asphalt in Costa Mesa. Time to plant more trees. The OC Fair parking Lot, OCC parking lot as well as City Hall, should have many more trees, and those are public facilities which you control. .

My greater question is how is this going to be paid for? This endeavor will cost a lot, so what is going to get cut in order for this plan to be put in place. The new bike lanes look amazing, too bad they are unused and still look brand new. As for busing, unless you start building high rises up and down the thoroughfares, it is not in our culture to walk 2 blocks to a bus stop, pay $2 and ride a bus for 2 miles to the grocery store and then back on the bus, another $2 to get back home. Southern Californians are too independent, and love their cars, you know that, the study just does not want to call that out.

Good luck with your expensive plan. I would prefer you would fix the potholes, clean up the trash on the streets/sidewalks/parking lots, plant more trees and fields, and make it a better community rather than dream of one,

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SPRINGER, CHARLES

From: Le Wentz <wentzle@yahoo.com>
Sent: Tuesday, August 4, 2026 7:16 AM
To: sustainability
Subject: Sustainable life

I have been to multiple planning committee meetings and each time I have come away disappointed that climate change is not addressed in building plans! Not once was requiring solar panels on new construction even addressed! This is unacceptable!
Sent from my iPad
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SPRINGER, CHARLES

From: Mike Draganza <mdraganza@gmail.com>
Sent: Tuesday, August 4, 2026 4:44 PM
To: sustainability
Subject: Comments on the CAAP

How much CM taxpayer dollars went into creating this plan and what is the overall cost of implementation? Is that anywhere in the document?

What is the point of all this? if it's reducing CO2 in the atmosphere, that will make no difference at all in the total amount in the atmosphere, since China will continue to spew out massive amounts that swamp any savings from CM, California or the U.S.

This plan references a climate model. The problem is that these models have been wildly inaccurate. Since they have been wrong in every prediction up to this point, what makes you think they will correctly forecast 50-100 years out? We can't even tell what the weather will be 2 weeks out!

No taxpayer dollars should ge to funding EV infrastructure. If EVs were popular, private dollars would fund it. Sales of EVs have plummeted since the $7500 rebate was cancelled. For good reason. They're expensive, have limited range and have a tendency to catch on fire. Creating expensive infrastructure at taxpayer expense will not make people change their minds.

I strongly disagree with the city spending our dollars on this. The city should concentrate on basic services and get out of the green new deal scam.

Mike Draganza
Costa Mesa resident

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SPRINGER, CHARLES

From: melanie@coastalcorridor.org
Sent: Tuesday, August 4, 2026 5:40 PM
To: sustainability
Cc: 'Paul Waggoner'
Subject: Comments on the Costa Mesa Draft CAAP
Attachments: CCA Letter to Costa Mesa on Draft CAAP 080426 FINAL.pdf

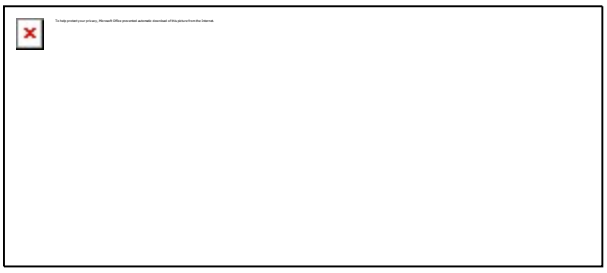
Greetings,

Please find Coastal Corridor Alliance's comments on the Draft Climate Action and Adaptation Plan. We understand some edits have been made and request a brief meeting to walk through those edits and outline our concerns on the document. We look forward to hearing from you!

Please confirm receipt.

Thank you,

Melanie Schlotterbeck
Stewardship Consultant
Cell: (714) 501-3133
Available: Mon - Fri



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SPRINGER, CHARLES

From: R M <robmillernow@gmail.com>
Sent: Monday, August 3, 2026 6:51 PM
To: sustainability
Subject: Re: Costa Mesa CAAP Constituent Comment - Permeable Paving

I forgot to include who I am --

Rob Miller - Costa Mesa District 5 Resident
1076 Townhouse Drive
Costa Mesa, CA 92627

On Mon, Aug 3, 2026 at 6:44 PM R M <robmillernow@gmail.com> wrote:

> As your constituent in District 5, I'd like to see policy implemented that encourages the use of permeable paving in construction, as shown in the inserted photo below.
>
> Permeable paving stones allowing grass to grow up while allowing water to drain down and through are already in use all over the world.
> They have a lovely aesthetic, are supremely functional, and are somehow simultaneously classic, innovative, ancient and forward-thinking.
>
> It seems that encouraging permeable tiling would be pursuant to
> "Policy CON-3.A.5: Work with public and private property owners to reduce stormwater runoff in urban areas to protect water quality in storm drainage channels, the Santa Ana River, and other local water courses that lead to the Pacific Ocean."
>
> Thank you for the consideration.



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SPRINGER, CHARLES

From: Steve Klein <stevek@adventure51.com>
Sent: Tuesday, August 4, 2026 12:13 AM
To: sustainability
Subject: Feedback on CAAP

CAAP Feedback:

1. These documents and policies are developed with very little real community engagement. They claim to be based on "bringing together a range of perspectives" but when your own documents state they've "engaged 340+ participants" and collected "158 survey responses", that's a trivial number compared to the 100,000+ residents. This tries to give the appearance of soliciting broad input but in practice no one takes the time. If you really wanted input, then put it to a vote.
2. The CAAP document says "While state policies are expected to reduce emissions over time, these actions alone are not sufficient to meet the City's long-term climate goals" – however, it does not appear to describe how the city's goals were chosen and why our goals are apparently greater than that mandated by state policies.
3. I oppose state-mandated reductions in GHG
4. It is my preference that the City actively work against state control, as Huntington Beach does
5. To the degree which the state compels the city to act, we should be doing the absolute minimum and obstructing the state as much as possible.
6. I object to the amount of money, time, and leadership focus spent on these proposals.
7. I will actively vote against, and campaign against, councilmembers who are promoting increased wasted money and effort on these topics

Steven Klein
1936 Flamingo Dr
Costa Mesa, CA 92626

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SPRINGER, CHARLES

From: Sarita Plata <s.plata7026@gmail.com>
Sent: Tuesday, August 4, 2026 7:29 PM
To: sustainability
Subject: Climate Action & Adaptation Plan

Hello,

It makes me super excited to see that Costa Mesa is developing a Climate Action & Adaptation Plan. I was born and raised in Costa Mesa, so it's beautiful to see how the City can implement strategies.

After reading the plan, I wanted to share my thoughts. Overall, my greatest recommendation is to be more explicit with environmental justice. Several sections failed to showcase how these climate actions interconnect with racial & economic inequalities. The Environmental Justice Policies that the City developed in 2026 should speak directly to the Climate Action Plan. They cannot be seen as separate, but rather as a joint effort; this includes more explicit mentions of EJ in the Climate Action Plan.

Chapter 3: Local Hazards

I found the explanations of climate hazards easy to understand and engaging. The use of map visualizations also helped me visualize where these local hazards occur. However, I was disappointed to see the lack of representation for environmental justice. The impacts of climate change are deeply interconnected with racial and economic inequalities. Latino and low-income communities face the brunt of climate change impacts. I would recommend more explicit mention of which populations are vulnerable. Showcasing this relationship with maps, including an overlay of racial and income status, is crucial!

Chapter 4: Community Engagement

I'd be interested to know how many Disadvantaged Communities/EJ communities participated. How many of the pop-ups were in these neighborhoods? Underserved and minority communities should be a major stakeholder group!

Chapter 5:

The objectives listed for transportation are strong, especially in decarbonization. Yet, the transition to electrification raises barriers such as affordability and reliability. These barriers are more pronounced in environmental justice neighborhoods that already face barriers to paying electricity bills. Renewable energy is not cheap. Not all households, especially low-income households, have the budget to adopt EVs. Yet many of these communities rely on personal vehicles for work. I would like to see a more explicit strategy and outline about how the City expects to address these barriers. Furthermore, historically marginalized communities often have a lot of skepticism towards EVs. How is the City hoping to address that?

Thank you

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