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BIODIVERSITY ACTION PLAN

1 BACKGROUND

Fortum’s operations, including hydropower production in Sweden, Germany and Finland, have an impact on local biodiversity. Hydropower construction and operation alters water systems by abstraction, impoundment and regulation of water level and flow, and therefore impacts the biodiversity of the local aquatic ecosystems, particularly the fish population. However, hydropower is important in the fight against climate change, which is globally one of the greatest threats to biodiversity. Emissions from fossil fuel-based energy production may impact biodiversity at a global and local level. Increasing CO₂-free energy production mitigates the biodiversity loss caused by climate change. The construction of any facility may have impacts on biodiversity. Indirect impacts may be caused by, for example, the procurement of biomass for use as fuel or raw material, as well as the procurement of other fuels.

Fortum aims to improve biodiversity in connection with its operations. The need for measures is defined in the [Biodiversity Manual](#) applicable to Fortum, excluding Uniper. The actions are focused on priority areas with high biodiversity value or those with high potential for improvement. This Group-level action plan is based on measures going beyond site-specific legal or license obligations and planned in the Generation and City Solutions Divisions and Uniper. In addition to the measures listed in this action plan, Fortum is taking part in several biodiversity-related research projects.

Fortum’s Group target for biodiversity for 2021 was at least 12 major voluntary measures enhancing biodiversity. 13 measures were implemented; the measures included in the target are marked in the column “Status”. The actions are presented by the responsible organisation at Fortum or Uniper. During 2022, Fortum’s target is to develop a science-based strategy to measure and enhance the biodiversity impacts of the Group’s operations and the new developments.

Our biodiversity-related measures are connected mainly to the Sustainable Development Goals 15 and 14:



SDG 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss

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SDG 14. Conserve and sustainably use the oceans, seas, and marine resources for sustainable development

2 TARGETS

The main target of this action plan is to improve biodiversity in connection with the watercourses where we operate hydropower plants in Sweden, Germany and Finland. Additionally, the action plan aims to improve terrestrial biodiversity of some individual locations near Fortum’s operations.

3 ACTIONS

Action	Location	Schedule	Cooperation partners	Status
Fortum Generation and Uniper, Hydropower, Sweden				
Dam removal projects	Ejen, Stor-Draggen and Kollsjön, River Limån, Sweden	2018 - 2021		Finalised Included in the 2021 target
<p>Target: Remove migration barriers in River Limån</p> <p>Description: The Limån river system is identified as a potentially valuable spawning ground for the endangered Siljan trout and whitefish, as well as a potential habitat for freshwater pearl mussel. Fortum had three dams in the river system with low profitability, and in 2018 the application process to remove the dams was started. Permits were obtained in spring 2021 and the dams were successfully removed July - October 2021. The dam removal projects were planned in close collaboration with property owners by the affected lakes and carried out with state-of-the-art methods without lowering water levels in the lakes. Other dam owners in the river are also planning on dam removals, which would open up the entire river system for migrating aquatic organisms.</p> <p>In Swedish: https://www.fortum.se/media/2021/03/klartecken-friare-vattenfloden-i-ejen-stor-draggen-och-kollsjon</p>				

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Action	Location	Schedule	Cooperation partners	Status
Habitat improvement of flood plains and flood forests near Untra hydropower plant	Untra HPP*, Lower River Dalälven, Sweden	2011-	Upplandstiftelsen	Planning ongoing for measures in 2022. Included in the 2021 target
<p>Target: Improving wetland biodiversity values</p> <p>Description: The project continues in 2022 and consists of various measures to develop the high biodiversity values that are linked to Fortum's land areas surrounding the Untra hydropower plant in River Dalälven. In 2021, the following measures were implemented: Spruce forest clearing in a three-hectare area; free-cutting of old deciduous trees and clearing of spruce established in a flood forest area; parts of wetlands were cleared and reed-controlled to facilitate future mowing. For 2022, the aim is to work on clearing wetland and combating reed growth to continue mowing in Ambricka hay meadow. A follow-up study on previous years' wetland actions also will be carried out.</p> <p>In Swedish: https://www.fortum.se/media/2021/03/okade-naturvarden-kring-untra-vid-dalalven</p>				
Habitat improvements	River Klarälven, Sweden	2021	County of Värmland	Cancelled. Planned but not possible for Fortum to finance, due to lack of solution for required financing terms.
<p>Target: Improvements for red-listed species</p> <p>Description: Control of invasive species (e.g. lupinus). Improving habitat for red-listed species, e.g. transportation of sand, clearing vegetation. Unfortunately, no measures were carried out in 2020. The County Administration Board is the initiative owner of possible actions along the river.</p>				

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Action	Location	Schedule	Cooperation partners	Status
Habitat improvements around Fortum hydropower plants	Edsforsen, Forshult, Dejefors, Forshaga, Krakerud, Munkfors and Skoga HPPs, River Klarälven, Sweden	2019-	County of Värmland	Ongoing Included in the 2021 target
<p>Target: Improvements for red-listed species and managing invasive species</p> <p>Description: The biodiversity project was initiated by Fortum in 2018 through an inventory that identified possible biodiversity measures near eight hydropower plants in River Klarälven. Measures started to be carried out in 2019, mainly the cutting and removal of invasive species and other plants. In 2020, the work became a pilot project with One Nordic as a contracting partner. A visit to the Forshult hydropower plant and surroundings took place in spring 2021 to determine the best actions for 2021. Experts from the County Administration Board of Värmland, One Nordic, and Fortum participated. Forestry work was done in 2021 to protect older trees and to support leafy trees, but also to increase light input for the establishment of ground flora. Bush wood was cleared to enable the re-establishment of meadow areas. So far, measures have been implemented to make annual mowing possible. A mowing beam has been purchased to help recreate meadows in the coming years. Removing bark from trees accelerates the process of aging, which created more dead wood of high value for insects and birds. Large pine was felled to stimulate the establishment of leafy trees. Birdhouses were installed in the area. Similar actions were also done near the Dejefors, Edsforsen, Forshaga, Krakerud, Munkfors and Skoga HPPs. In 2022, a plan for short- and long-term nature conservation measures is being produced with an external consultant. The plan will target the most important and most cost-effective measures and how to implement them. The plan also aims to provide a better basis for follow-up and evaluation.</p>				
Habitat improvement around Söräng hydropower plant	Söräng (former hydropower plant), River Ljusnan, Sweden	2021-2022		Planning ongoing
<p>Target: Improvements for fish or terrestrial species.</p> <p>Description: In 2021 an external consultant conducted a field study to determine the potential for habitat improvements. In 2022 the study will be used to determine which biodiversity measures to implement.</p>				
Avesta hydropower plant meadow improvement	Avesta HPP, River Dalälven, Sweden	2021-2022	Municipality of Avesta	Ongoing Included in the 2021 target
<p>Target: Improvement for butterflies and meadow flowers</p> <p>Description: Half of the meadow, 5000 m², underwent a controlled burn to enhance the vegetation and insects, such as butterflies. The other half was burned in April 2022. Sand banks were built to support wild bees, and dead wood piles were created for insect habitats and nourishment. A butterfly and meadow flower study took place in 2021. A more extensive study is planned for 2022. New signs and information postings are planned to communicate the biodiversity work in the popular recreation area.</p>				

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Action	Location	Schedule	Cooperation partners	Status
Test of a combined turbine and fishway for both ascending and descending fish	Upper Finsjö HPP, River Emån, Sweden	2022 - 2026	LIFE-connects, University of Karlstad	Projecting
<p>Target: Improved connectivity on site and possible new technology</p> <p>Description: A new combined turbine and fishway will be tested and evaluated. The fishway is a double Archimedes-screw that allows fish to pass both up- and downstream. The project focuses on the passage-efficiency for target-species. At upper Finsjö HPP, there is already a nature-like fishway and a downstream solution in place that is comparable to the double-screw. The project is a part of “LIFE-connects”.</p> <p>https://storymaps.arcgis.com/stories/15dbb926291a4018996c51b670269fbd</p>				
Securing of residual flow without time-lapse	Ätrafors, River Ätran, Sweden	2021		Finalised
<p>Target: Protection of downstream habitats and N2000 area</p> <p>Description: An outage at Ätrafors HPP means that the minimum flow through the turbines must be replaced by a minimum flow through the dam gates, which has a delay of 20-30 minutes. In order to avoid a negative impact on downstream habitats, a technical solution allowing water to pass the power plant without delay has been installed.</p>				
Evaluation of effects of dam removal at Marieberg, River Mörrum	Marieberg, River Mörrum, Sweden	2020 -	LIFE-connects, University of Karlstad	Ongoing
<p>Target: River restoration</p> <p>Description: After the dam removal in 2020, the effects on the river ecology, including fish migration, macrophytes and big-shell mussels, are now being monitored by the University of Karlstad.</p> <p>https://storymaps.arcgis.com/stories/15dbb926291a4018996c51b670269fbd</p>				

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Action	Location	Schedule	Cooperation partners	Status
Krafttag ål (Eel program)	Rivers Göta älv, Lagan, Ätran and Motala ström, Sweden	2015-	Swedish Agency for Marine and Water Management and five hydropower companies	Yearly implementation Included in the 2021 target
<p>Target: Actions for the threatened eel population</p> <p>Description: Trap and transport of silver eels was carried out during 2021 in four Swedish rivers: Göta älv, Lagan, Ätran, and Motala ström. Migrating eels are transported from lakes to areas downstream hydropower plants. The work is performed in an industry programme, managed by Energiforsk, with participation from Fortum, Uniper and four other hydropower companies.</p>				
Collecting and distributing elvers in River Ätran through new and modern elver traps at Ätrafors hydropower plant	Ätrafors HPP, River Ätran, Sweden	2017-		Finished Included in the 2021 target
<p>Target: Actions for the threatened eel population</p> <p>Description: This obligation has been substituted with the import and distribution of elvers from England and France, but has been started up again voluntarily. Elvers ascending from the sea are collected and distributed above the dam in Ätrafors.</p>				
Trap and transport of silver eel	Lake Finjasjön, Helge å, Sweden	2021-	Finjasjöns fiskveårdsförening	Ongoing
<p>Target: Improvement for fish</p> <p>Description: Fortum is contributing financially to a trap and transport programme in Lake Finsjasjön. The aim is to catch silver eel ready to migrate to the Sargasso Sea, and release them below the Torsebro hydropower plant, from where they have free access to the river mouth.</p>				

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Action	Location	Schedule	Cooperation partners	Status
Fortum Generation, Hydropower, Finland				
Releases of young salmon and sea trout in the tributaries of River Oulujoki	Muhos, Utajärvi and Vaala, River Oulujoki, Finland	2005-	Municipalities of Muhos, Utajärvi and Vaala, ELY centre** of North Ostrobothnia	Yearly implementation Included in the 2021 target
<p>Target: Improve migrant fish populations in River Oulujoki by releasing fish fry to breeding grounds</p> <p>Description: In addition to power companies' legal obligations for fish stocking in the Oulujoki catchment area, about 50,000 one-year-old salmon or sea trout are stocked yearly to River Oulujoki tributaries, the Muhosjoki, Utosjoki and Kutujoki rivers. This fish stocking project initiated in 2005 contributes to the creation of a viable population of migrating fish in River Oulujoki. Monitoring has proven that fish have grown well in the stocking area. In 2021, 5,500 one-year-old salmon and 4,900 one-year-old sea trout were stocked in River Kutujoki, 11,500 salmon in River Utosjoki, and 15,000 sea trout in River Muhosjoki.</p>				
Breeding area study of migratory fish in River Oulujoki	Lower River Oulujoki, Finland	2021	Oulun Energia	Finalised
<p>Target: Study of potential breeding areas in River Oulujoki</p> <p>Description: The study examined potential breeding areas for migratory fish in River Oulujoki, and the feasibility of the study areas was determined. Additionally, the significance of the study areas in terms of strengthening the breeding opportunities and natural cycle of migratory fish was also reviewed. The work was finalised in October 2021. Included in the seven study areas located in conjunction with the power plants are the diversion channels of Fortum's Montta, Pälli and Nuojua power plants, and the old channel of Oulun Energia's Merikoski power plant located in the heart of the city of Oulu.</p> <p>Fortum and Oulun Energia to conduct breeding area study of migratory fish in the River Oulujoki Fortum</p>				

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Action	Location	Schedule	Cooperation partners	Status
Montta fish trap operation and development	Montta HPP, Muhos, River Oulujoki, Finland	2021-2022	Municipalities of Muhos, Utajärvi and Vaala, ELY centre** of North Ostrobothnia	Ongoing Included in the 2021 target
<p>Target: Strengthen stream fish populations in River Oulujoki</p> <p>Description: The main focus at the Montta fish trap is to trap and transport mature salmonids to the improved spawning areas in the tributaries above several dams upstream in River Oulujoki. In 2020, we transported the first salmon and trout spawning pairs to River Utosjoki, a tributary of Oulujoki. When suitable, one of the aims is to try to collect eggs from the trapped salmon to improve the quality and the genetic biodiversity of the farmed salmon population at Fortum’s fish farm in Montta. The expected outcome is an improvement in the salmon stocking results. However, the collection of eggs at the trap and transport device, inaugurated in 2017, has not been successful so far, due to the low number of mature female fish returning from the sea. In 2021, trapped mature salmon were transported to River Kutujoki, Oulujoki’s tributary. The trap’s collection basins were reduced in size and the control gates of the entrance were improved in order to facilitate the fish trap’s operation. In 2022, we will start to monitor the results of the transports in Rivers Kutujoki and Utosjoki by electric fishing.</p> <p>https://www.fortum.com/media/2021/08/fish-trap-and-transfer-facility-modification-work-continues-montta-hydropower-plant-finland</p>				
Habitat restorations in River Vuoksi	Imatra, River Vuoksi, Finland	2013-	Municipality of Imatra, ELY centre** of South-Eastern Finland	Completed/Planning ongoing
<p>Target: Strengthen stream fish populations in River Vuoksi in eastern Finland</p> <p>Description: Fish habitat improvements in the Finnish part of River Vuoksi have been planned using Fortum’s habitat modelling tool to identify locations suitable for restoration as habitats for local stream fish populations. Since the beginning of the project, improvement measures have already been carried out at nine locations near the Tainionkoski and Imatra power plants. The bottom of the river bed is being reshaped and gravel and stones are being added to make the bottom more natural and more suitable for spawning and to provide shelter for young fish. In 2022, works were carried out in the area upstream from the Tainionkoski power plant where a small island was removed and the bottom of the river bed was reshaped to provide more underwater habitat for the fish.</p> <p>https://www.fortum.com/media/2022/04/river-vuoksi-habitat-restorations-area-upstream-tainionkoski-improve-trout-breeding-opportunities</p>				

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Action	Location	Schedule	Cooperation partners	Status
Fishheart solution for upstream passage of fish at Leppikoski hydropower plant and supporting actions	Leppikoski HPP, Paltamo, River Emäjoki, Finland	2021-2022	Fishing rights owners' associations Paltamo I and Paltamo II	Ongoing Included in the 2021 target
<p>Target: Give fish the possibility to pass the dam</p> <p>Description: Fortum's goal is to strengthen the natural cycle of lake trout in the vicinity of the Leppikoski hydropower plant in the Oulujoki watershed, which is one of the top targets in the national fishway strategy. In 2021, Fortum constructed a hydraulic dam bypass solution, Fishheart, at the Leppikoski power plant. Fishheart is a Finnish innovation to enable fish passage over a migratory obstacle. In order for the fish passage to be useful in strengthening migratory fish stocks, habitats and breeding areas are needed for the fish to migrate to. A total of 26 hectares of potential habitats and breeding areas of lake trout can be found in the tributaries above Leppikoski. During 2021, we also improved migratory fish habitats in two stream areas above Leppikoski. In addition, we are stocking the river with juvenile lake trout. In 2022, Fishheart will be in operation from beginning of June until 15th of October.</p> <p>https://www.fortum.com/media/2021/10/first-trout-have-been-transferred-upstream-over-leppikoski-hydropower-plant-finland-leppikoski-fishheart-inaugurated</p>				
Fortum City Solutions, Recycling and Waste, Sweden				
Kumla butterfly landscape	Kumla, Sweden	2020-2022	Swedish Transport Administration (Trafikverket), Swedish Environmental Protection Agency / County Administrative Board, Kumla municipality, Vattenfall	Ongoing
<p>Target: Increase biodiversity by restoring former grasslands to meadows</p> <p>Description: In Sweden, we are taking part in the project coordinated by the Kumla municipality to build a butterfly landscape in the area close to our waste treatment facility. The aim of the butterfly landscape project is to increase the biodiversity in the area and to restore former grasslands to benefit plants and insects, and butterflies in particular, which thrive in meadowland with calcareous soil. The project also aims to use the butterfly path and landscape for educational purposes. During 2020, sandy habitats for solitary bees were created, and meadows were restored in the project. In 2021, the areas of meadow land have been increased in order to increase biodiversity, and measures to simplify the future care of these areas have been made. In 2022, we are also planning to plant meadow flowers on at least 2 hectares of landfill surfaces in Kumla at Fortum's waste facility site, close to the location of the Kumla butterfly landscape.</p> <p>https://www.fortum.com/media/2021/06/butterfly-landscape-kumla-sweden</p>				

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Action	Location	Schedule	Cooperation partners	Status
Fortum Generation, Hydropower/Thermal, Finland				
Landscaping an old landfill area / storage field	Old Inkoo power plant site, Finland	2021-		Ongoing
<p>Target: A functioning meadow ecosystem</p> <p>Description: During the construction of the power plant in the 1970s, the area was a landfill for a construction site. After construction, the area was levelled and resurfaced and served as a storage field during the operation of the power plant. In connection with the demolition of the power plant, it was stated that the continued use of the landfill area is problematic due to the waste in the soil. With the permission of the municipality of Inkoo, the area was left untouched. In 2021, the sand field was transformed into a meadow suitable for insects, especially butterflies. During 2022, we are planning to maintain and monitor the growth of the meadow and the presence of insects in the area. The maintenance instructions for the meadow have been prepared by ProAgria.</p>				
Identifying and removing alien plant species in Inkoo	Inkoo Fagervik, Finland	2022-	Inkoo Shipping, Inkoo municipality, Fortum WS	Mapping started
<p>Target: Minimising biodiversity impact of alien species</p> <p>Description: Mapping is carried out in cooperation with other parties operating in the area. The consultant will draw up eradication plans for the alien plants found. The aim of the cooperation between operators is to prevent plants from spreading back to areas where they have already been removed. Consultant: ProAgria.</p>				
Uniper, Hydropower, Germany				
Higher level of ecological flow	Powerplant Schönmühl, River Loisach, Germany	Since end of 2020	District administration Bad Toelz - Wolfratshausen	Ongoing Included in the 2021 target
<p>Target: Restore habitats of river animals</p> <p>Description: After the expiration of the agreement with the district administration Bad Toelz - Wolfratshausen, in which the increase of the minimum ecological flow (e-flow) was regulated, Uniper voluntarily agreed to an e-flow higher than formally requested to improve the habitats of river animals. To examine the existing e-flow conditions and ensure the accessibility of the fish pass for migrating species, a voluntary study is planned for 2022 and 2023.</p>				

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Action	Location	Schedule	Cooperation partners	Status
Catch & Carry: Safe migration of eels	River Main and Regnitz, Germany	Since 2009, annually in winter	Local fisheries authorities	Ongoing Included in the 2021 target
<p>Target: Enable the migration of eels to the Sargasso Sea</p> <p>Description: As a catadromous species, the European eel (<i>Anguilla Anguilla</i>) is native to German rivers, such as the Main and Rhine, and migrates to the Sargasso Sea to spawn. To ensure the navigability of the Main, barrages are necessary, which are mainly used for energy production as well. These barrages block fish from downstream migration and also the eels from migrating to the Sargasso Sea.</p> <p>The Migromat system, specially developed to detect the pre-migratory restlessness of the eels, is used to determine the migration waves precisely. During this time, fishermen are ready to catch the eels as gently as possible. The eels are then collected and released into the Rhine or North Sea. This procedure is called Catch & Carry. Uniper signed the contract for Catch & Carry in 2009 and adjusted the contract to a sponsored sum of 75,000 € in 2011. Annually, about 6000kg of eels are caught and transported safely into the Rhine. The Catch & Carry operation sponsored by Uniper takes place on the Main from km 77,720 to 389,425.</p>				
Litzauer loop, provision of land	Litzauer loop, River Lech, Burggen, Germany	2022	Local water management authority Weilheim	Ongoing
<p>Target: Self-dynamic development</p> <p>Description: For the self-dynamic development of the Litzauer Schleife, Uniper transfers areas that enable the water body to re-establish habitats, such as scours, sliding and rebounding slopes, or sand and gravel banks.</p>				
Litzauer loop: Improved passage to the Riesner Bach (River Lech)	Litzauer loop, River Lech, Burggen, Germany	2021	Local water management authority Weilheim	Finalised Included in the 2021 target
<p>Target: Improvement of the connection of side arms</p> <p>Description: Many years ago, the Riesner Bach, a small tributary to River Lech, was an important spawning habitat for the fish species of the River Lech. To improve the connectivity into the Riesner Bach for spawning fish, in 2021 the estuary was shifted to fit better into the river bend of the River Lech. Due to dampening effects, the Riesner Bach is less influenced by surge events and therefore particularly suitable as a refuge for fish larvae and juvenile fish.</p>				

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Action	Location	Schedule	Cooperation partners	Status
Structural measures in the reservoir Landau	Reservoir Landau, River Isar, Germany	Planning of approval in 2020, construction process estimated for 2023	Water management authority Landau	Ongoing
<p>Target: Creation of habitats for aquatic life</p> <p>Description: Structural measures in the reservoir Landau, including the placement of gravel islands, the flattening of certain bank areas, and the partial removal of the bank reinforcement. In addition, a new side arm is to be created.</p>				
Uniper Generation, Thermal, UK				
Managing an important local nature reserve	Connahs Quay Power Station, UK	2021-		Ongoing
<p>Target: Improving the ecosystems for birds</p> <p>Description: Located on the River Dee Estuary (on the North Wales / North West England border) is Connah’s Quay Power Station. The Dee Estuary is one of the United Kingdom’s premier areas of coastal saltmarsh, providing ample migratory habitat for both wetland and shorebirds. The Dee Estuary has designation status as a SSSI, Ramsar, Special Area of Conservation (SAC) and a Special Protection Area (SPA). A 56-ha section of Uniper’s landholding upon the west bank of the Dee is managed by the Power Station as a nature reserve in conjunction with the tenants Deeside Naturalists Society (DNS). The tenancy agreement with DNS is in the process of being renewed, which will further extend the partnership to tenant the nature reserve for a further 7 years. At the west end of the reserve, Uniper has provided a large two-tier hide overlooking the river to the north and east alongside close-up views across a SSSI Wetland meadow area to the south of the building. Further upstream, a number of coastal bunded pools have been created, featuring fluctuating water levels (according to tidal conditions); these are overlooked by an additional company-supported field study centre (utilised by the local community). Following a review of erosion challenges on the bunded pools, the site hopes to define a new strategy in 2022 for their ongoing management. With this wide variety of ecological features, the reserve hosts a large spectrum of bird species (including many rare and legally protected varieties). Whilst some ecological mitigatory measures were required by the planning consent, Uniper has gone above these historical requirements to provide and long-term manage a highly important asset that is integral to the local community and longer term a benefit to local biodiversity. In 2022, a new 5-year land management plan is also being prepared, which will provide detail on the management of the reserve for the next 5 years.</p>				

*HPP = hydropower plant, **ELY centre = Centre for Economic Development, Transport and the Environment