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WATERWAYS
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BRIDGING LANDSCAPES

HOW FOOTBRIDGES CONNECT US TO THE NATURAL WORLD

What shapes the relationship between a bridge and the watercourse it crosses, and how does that change in a different environment or location? Helena Russell explores the world of footbridges and considers how they influence and are defined by what surrounds them

In its simplest form, a bridge is a means of getting from one side of an obstacle to the other – whether that be a man-made obstruction such as a road or railway, or natural barrier like a deep ravine or raging river.

But bridges are often much more than that; they encourage interaction with the landscape, open up new views to be enjoyed and routes to be explored, and revitalise disused docks and waterways. In some cases, they are vital lifelines that provide access to healthcare, jobs and education for remote communities where rivers can be impassable after heavy rain.

A movable feast

Man-made waterways feature in many of the world's capital cities; originally built to bring vital supplies right into the heart of the metropolis, the old docks and canals that ships have long outgrown are being redeveloped as neighbourhoods for housing, business and leisure.

Central to their successful reinvention, and key to encouraging active travel, is the opening up of new routes for walking and cycling. Bridges are essential for such networks, linking quaysides and cutting travel distances substantially; when designed with imagination and flair, such structures are elevated from functional to fabulous, their elegance and drama even drawing tourists to the area. ●

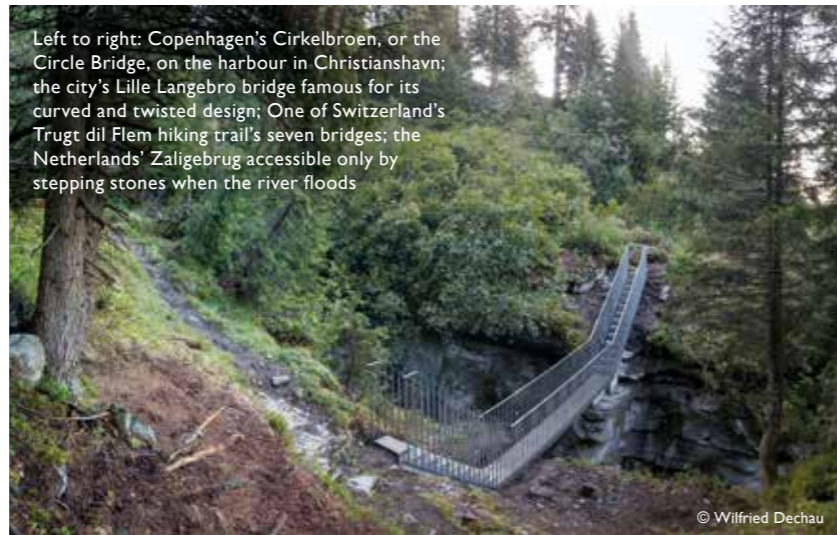
Copenhagen's old quayside has seen the construction of five new footbridges in the past decade, revitalising this much-loved tourist destination



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Left to right: Copenhagen's Cirkelbroen, or the Circle Bridge, on the harbour in Christianshavn; the city's Lille Langebro bridge famous for its curved and twisted design; One of Switzerland's Trugt dil Flem hiking trail's seven bridges; the Netherlands' Zaligebrug accessible only by stepping stones when the river floods

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721m

The length of the longest suspension footbridge in the world, the Sky Bridge in the region of East Bohemia, Czech Republic

853

feet up in the air is where you'll find the world's highest glass-bottomed bridge, China's magnificent Zhangjiajie Grand Canyon Glass Footbridge

£18.2m

Was the cost of London's Millennium Bridge, once known as the 'Wobbly Bridge' due to its (now fixed) propensity to wobble under pressure

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steel frames are placed along the length of Iowa's High Trestle Trail Bridge to recreate the view through a mine shaft, a reference to the area's history of mining

The Danish capital Copenhagen is home to the country's largest port; while the outer docks still welcome thousands of cargo and cruise ships every year, the inner harbour now plays host to cyclists and walkers visiting the Danish Opera House, feasting on fresh seafood and taking selfies with the *Little Mermaid*. But it's not just the conventional tourist attractions that bring visitors to the neighbourhood – many seek the cooling dockside environment, water sports, swimming pools and hire boats, and views back to the city.

Over the last decade the city council has improved connectivity around the old quayside with the addition of no fewer than five new bridges for pedestrians and cyclists. Four of the five are designed to open, and they all do it in dramatically different ways.

The three-way Butterfly Bridge is so-called because its steel 'wings' raise to the vertical, pivoting on a central hub to let boats through, and creating a shape reminiscent of a butterfly at rest.

Both Lille Langebro and the Inner Harbour Bridge have decks that open at low level – while

they may lack a dramatic gesture that can be seen from afar, each one features a different opening mechanism and both are unusual. Lille Langebro makes space for boats by raising the middle length of its deck and turning it by 90 degrees on a pivot point right at the middle of the bridge. Meanwhile the central section of the Inner Harbour Bridge retracts into a specially designed void on each side of the approach structure – a feature that earned it the nickname of the 'kissing bridge' when it was first built.

Probably the most unusual of the new crossings is the Circle Bridge, conceived by artist Olafur Eliasson and formed of five interconnected circular platforms, each topped by masts, directly referencing the sailing ships of the area. The route across the bridge meanders from one platform to the next, slowing cyclists down and making space for users to linger and enjoy views across the city. Three of the circular platforms swing sideways as a single unit, so that boats can enter and leave the canal.

Wild things

Not all designers want their footbridges to make a statement – when such structures are built in stunning landscapes, they should not try to compete with the natural beauty that surrounds them.

The 13km-long Trugt dil Flem hiking trail in Switzerland takes walkers deep into a dramatic ravine, and was opened up through the construction of seven bridges. The route links the tectonic landscape of the UNESCO World Heritage Site of Sardona to the Ruinaulta Gorge – sometimes referred to as Switzerland's 'Grand Canyon' –

and is one of a growing number of tourist attractions being created to boost economic resilience in Alpine areas that have traditionally relied heavily on winter sports.

Through his designs, Swiss engineer Jürg Conzett sought to bring the bridges – and the hikers themselves – right into the densely overgrown environment of the ravine, rather

than just creating viewpoints from which the landscape could be observed. He wanted visitors to experience the untamed drama at close quarters – the soundscape of thundering water, the sparkling reflections and damp cloud of mist – and to feel that they were part of it.

Conzett considered it crucial that each bridge should touch as lightly as possible on the landscape, effectively becoming part of its environment and perhaps even indistinguishable from it. This modest philosophy contrasts with the more conventional approach to bridge design, which seeks to create a statement in the landscape, or a gateway to a town or city.

Whenever infrastructure is created to open up a new route, the very act of doing so inevitably puts at risk the characteristics that first made it attractive. Conzett selected natural materials as far as possible for his 'embedded' bridges – timber, stone and concrete – and fastened them directly to rock faces

where conditions allowed. The location of one bridge, close to a dramatic waterfall, was changed because Conzett thought it an 'unacceptable intrusion' into a 'wild and untouched landscape'.

Lifelines

Seasonal and climatic changes in river levels can be challenging for bridge designers and users alike, and in extreme cases, prevent those living in remote villages from accessing healthcare, education and jobs. The charity Bridges to Prosperity brings bridge professionals from around the world together with communities that need a safe route over a watercourse, to teach them how to build and maintain basic footbridges using locally sourced materials. Often these rivers dry up in the summer, but are impassable after winter rains.

Sustainability is a central part of the charity's ethos, to ensure that rural communities can continue to maintain these vital structures without help from others. Their footbridge

designs are durable and resilient, intended to provide safe access for generations. Bridges to Prosperity has proven that the presence of a bridge directly impacts on poverty and education: 12% more children enrol in school, and there is a 30% increase in labour market income when a community can access the school and market all year round.

Meanwhile in the Netherlands, access to a footbridge built as part of the city of Nijmegen's 'room for the river' project is designed to be lost as water levels rise. The scheme saw the creation of a new flood plain alongside the Waal river, to accommodate overflow after heavy rain and prevent flooding in the city.

Under normal conditions the 200m-long Zalige Bridge is approached along a paved footway, but when the river floods, it can only be reached on stepping stones. When the water depth breaches a certain level, even the stepping stones disappear, providing a stark reminder of the threat we face from climate change and its impact on global sea levels.



Kagarama Suspended Bridge, Rwanda