KATH BOWMER

Caring for waterways

Kath Bowmer is an expert in how to improve the health of rivers affected by human use.

Kath Bowmer is an environmental scientist who has spent her career investigating how to keep rivers and wetlands healthy and promoting the environmental needs of rivers. She uses her expertise to give advice to governments and organisations on how waterways should be used and cared for.

fact file

Born: 26 April 1945

Schooling: (United Kingdom) Herbert Strutt School

Selected achievements:

E. and J. D. Marsden Prize, University of Nottingham, 1966

Australian Museum Eureka Prize, 1994

Landcare Central Riverina Award, 2001

Attracted to nature

Kathleen Harrison Bowmer grew up in the country town of Belper, in the north of England. As a child, Kath spent as much time as she could outdoors. When she was in secondary school, an inspirational teacher ran a series of week-long courses at field-study centres in beautiful parts of the country. Her class collected and recorded the small animals they found under stones. Kath was fascinated. Later, after learning that people in other countries were dying of starvation, she decided to study **agriculture**. She wanted to help the world grow enough food.

Kath's PhD research

In 1967, Kath began her **PhD** at the University of Nottingham. She studied how long the **herbicide** atrazine took to break down in different kinds of soil. To conduct her research, Kath used her skills and knowledge in many types of science, including chemistry, **microbiology** and **plant physiology**.

Moving to Australia

In 1970, Kath accepted a job in irrigation research for the Commonwealth Scientific and Industrial Research Organisation (CSIRO), in Griffith, New South Wales. Griffith is a rich agricultural district on the Murrumbidgee River. Farmers use irrigation from the Murrumbidgee to grow crops such as rice, grapes, fruit and vegetables. They protect their crops using many different chemicals.

Kath's first projects were to measure herbicides in soil, irrigation canals and other waterways. It was important to know how long these chemicals remained in soil, and whether any were being washed back into water systems, where they could harm other living things.

Controlling aquatic weeds and alligator weed

Kath also began to investigate how to best use chemicals to control **aquatic weeds**, which can stop water flowing in irrigation channels.

In the mid-1980s, Kath worked on finding herbicides to control the South American plant alligator weed, which can take over waterways and farmland. She tried out 21 herbicides on the weed in the wild, and found the best methods to apply them. She also investigated how alligator weed grew back after spraying.

When Kath began working for the CSIRO in 1970, she was the only female scientist in the Griffith laboratory.

Science jargon

herbicide chemical used to kill weeds

microbiology study of tiny living things

plant physiology study of how plants work

aquatic weeds weeds that grow in water

more about...

IRRIGATION

Irrigation means taking water from a river or lake and using it on farms to grow food crops or pasture for animals to graze on. Water is pumped out of the river and carried through pipes or canals to farms. Excess irrigation water may drain back into the river, taking any chemicals used on farms with it.

Leading the Rivers and Wetlands Program

In 1988, Kath became leader of the Commonwealth Scientific and Industrial Research Organisation (CSIRO)'s Rivers and Wetlands Program. This group of scientists explored all the factors that can affect the health of rivers and wetlands.

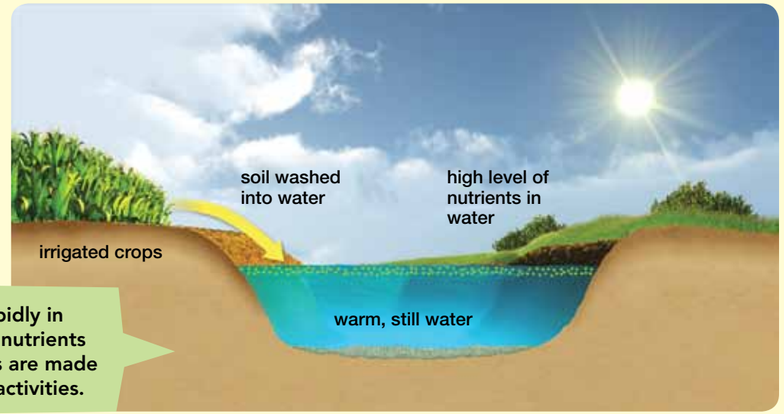
One of the group's many projects was to find ways to test for the presence of tiny **organisms** called blue-green algae in the Griffith town water supply. Even low numbers of blue-green algae make water taste and smell bad, so the scientists developed a test that could detect them, and the chemicals they produced, at very low levels. They also investigated the conditions in which blue-green algae multiply.

the science behind it

BLUE-GREEN ALGAL BLOOMS

Blue-green algae are naturally present in water, usually in small numbers. A bloom occurs when blue-green algae grow in huge numbers. Blue-green algal blooms may kill other organisms. Some types of blue-green algae produce poisonous chemicals, and when a bloom occurs these chemicals can make water unsafe to drink.

Blooms can occur naturally, but they happen more often when rivers are used to supply water for irrigation and when water is stored. If the amount of water in natural waterways is reduced, the remaining water may become shallower and warmer. Dams and weirs may stop water from flowing down a river. In still water, materials in the water settle to the bottom, so more light passes through the water. This helps algae to grow. Water running off farms, untreated sewage and stormwater contain more food (nutrients) for blue-green algae to feed on.



Blue-green algae grow rapidly in still, warm water in which nutrients are high. These conditions are made more common by human activities.

Advising on the 1991 Darling River bloom

In October 1991, the world's largest ever algal bloom began to form in the Darling River, New South Wales. It grew for weeks until over 1000 kilometres of the river could not be used by towns or for irrigation. The New South Wales Government declared a state of emergency.

Kath's expertise in testing for blue-green algae was needed urgently. With other water scientists, she advised the Government on how to manage the problem. The CSIRO put $3.5 million towards fighting the problem of algal blooms, and Kath helped plan how this money should be spent. She also joined a group of experts advising the Murray Darling Basin Commission, the organisation that managed the whole Murray–Darling river system, on how to prevent and control blue-green algal blooms.

Did you know?

Blue-green algae are not really algae, the group that includes seaweed, at all! Their true name is 'cyanobacteria', and they are a type of **bacteria** that gets their energy from the Sun.

Despite the efforts of the CSIRO and other organisations managing our rivers, blue-green algal blooms have continued to occur. This bloom in April 2009 affected about 800 kilometres of the Murray River.

A new idea: environmental flow

By the early 1990s, many water scientists had shown that human activities contributed to algal blooms. Governments and irrigators knew the Murray–Darling river system would be healthier if less waste was available for the algae to feed on. However, Kath and other water scientists knew this wasn't the whole story. In 1993, Kath worked hard to convince the Murray Darling Basin Commission that a river also needs a certain amount of water flowing through it to reduce algal blooms and to keep it healthy in other ways. This idea is now known as environmental flow.

the science behind it

HEALTHY RIVERS, ENVIRONMENTAL FLOW AND WATER SHARING

Healthy rivers are not overrun with **introduced species**. Living things are in balance with each other, and **native** fish and other aquatic animals can move along the river. When there is enough water, they can move between the river and nearby floodplains and wetlands.

To give a river an environmental flow means to make sure it has enough water going down it to keep it healthy. Often this can only be achieved if water is shared between the people using the river and the river itself.

Kath argued that to protect rivers like the Murrumbidgee, a share of water must be set aside to keep the river flowing and healthy.

Sharing water on the Murrumbidgee

From 1996 to 2002, Kath helped run a group giving advice on keeping the Murrumbidgee River healthy. This group worked to create one of the first water-sharing plans in Australia, describing how water should be allocated to the river and water users.

The idea of setting aside environmental water was a challenge for people living along the rivers. Farmers and communities who relied on irrigation were worried they would miss out on water, or have to pay more for it. Kath used her scientific understanding of river health to encourage people to look after the river, so its use could be **sustainable**. In the process, she learnt that for water sharing to work, everyone who used the river needed to have their opinions considered.

Unfortunately, when drought hit southeast Australia in the early 2000s, there was not enough water flowing in the Murrumbidgee and many other rivers for water-sharing plans to be carried out.

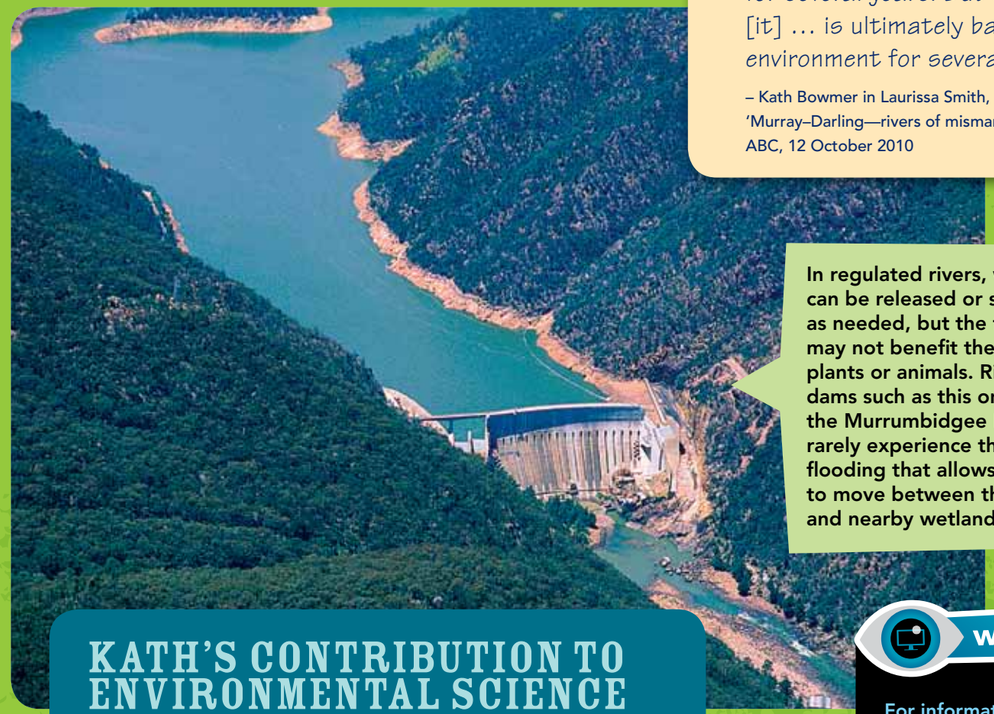
Putting water science into water policy

In 2004, Kath became professor of water policy at Charles Sturt University, New South Wales, and began advising organisations on their plans for water. She has written many articles and book chapters about how to care for waterways, and about the environmental effects of regulating a river's flow.

Working with regulated rivers

In regulated rivers, water flow is not natural. For example, in summer a river's waters would normally be low, but a regulated river's water levels may be kept high to provide water for irrigation. Kath continues to promote healthy rivers by arguing that river flow should be as natural as possible. Kath's latest research is to find the best ways to involve people in making decisions about water use.

> *Regulation, when dams were built, was regarded as a very important thing for Australia's prosperity and for dealing with the variability in climate we have, so we could store water for several years. But of course [it] … is ultimately bad for the environment for several reasons.*
>
> – Kath Bowmer in Laurissa Smith, 'Murray–Darling—rivers of mismanagement', ABC, 12 October 2010



In regulated rivers, water can be released or stored as needed, but the flow may not benefit the river's plants or animals. Rivers with dams such as this one on the Murrumbidgee River will rarely experience the natural flooding that allows animals to move between the river and nearby wetlands.

KATH'S CONTRIBUTION TO ENVIRONMENTAL SCIENCE

By investigating chemical pollution, aquatic weeds, algal blooms and environmental flow, Kath Bowmer has made many contributions to the scientific understanding of what waterways need to stay healthy. Environmental scientists continue to build on her work to manage Australia's precious water resources.

web watch

For information and activities about healthy waterways, see www.waterwatchmelbourne.org.au/content/activities_for_kids/activities_for_kids.asp