Dr Jackie King

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JACKIE KING

The riverkeeper

Current position:
Honorary Professor in the Institute of Water Studies at the University of the Western Cape.
Owner, Water Matters, Cape Town

Research interests:
Inland waters, ecological research and management

Awards

AWARDS

2021: WRC Legend Award
2019: Stockholm Water Prize
2019: WARMA, Zambia. Environmental Management Award
2016: WWF South Africa Living Planet Award
2016: Gold Medal of the Southern African Society of Aquatic Scientists
2003: National Women in Water Award: Research category
1996: Silver Medal of the Southern African Society of Aquatic Scientists

"Rivers are logical, changing in predictable ways from source to sea and through the seasons. They illustrate perfectly how complex and organised natural ecosystems are," says Dr Jackie King. "They are also the lifelines across vast landscapes, but are vanishing or drastically degrading globally at a higher rate than any other kind of ecosystem."

King is synonymous with river ecology in South Africa. She was one of the first ecologists to be funded by the WRC and, decades later, was chosen as the 2019 Laureate of the world's most prestigious water award for her contributions to the field. In its citation, the Stockholm Water Prize Nominating Committee noted that "Dr Jacqueline King has, through scientific rigour, selfless dedication and effective advocacy, transformed the way we think, talk and work with water as a flow of and for life."

A matriarch of river ecology, she helped expand the discourse of how we live on our planet, through developing concepts and techniques that allowed the ecological and social costs of water-resource plans to be predicted, as a balance to the predicted engineering and economic benefits. King's work has provided decision-makers with tools that support more informed and equitable decisions than was possible even 20 years ago.

Yet, she came to the research world relatively late, in her thirties, when she was introduced to the then unfamiliar field of freshwater ecology. Her story, she says, is proof that it's never too late to start.

An unexpected introduction to river ecology

King's first job on arrival in South Africa from England was to clean kennels for the SPCA in Bryanston, Johannesburg. Then, when she relocated to Cape Town with her husband she worked as an insurance clerk. At this point, she determined to do something with her life, lest she regret it when she was

Dr King at home in Cape Town. She pioneered environmental flow assessment research in South Africa.

Photo Supplied

old. At the age of 27, and without a matric qualification, she was accepted to study at the University of Cape Town (UCT) as a mature age student on the strength of her British O-level results.

Because she loves the natural world, King settled on zoology and botany. Though admitting she knew "absolutely nothing" about what awaited, she excelled. In her first year, in 1971, she won the class medal for B.Sc. Zoology and in 1974 she was awarded UCT's Purcell Prize for the best dissertation on any zoological subject. After completing her BSc (Hons.), the university offered her a number of marine-related PhD projects but she couldn't guarantee that she would always live by the sea.

Instead, she accepted an offer from the Percy Fitzpatrick Institute of African Ornithology, to study the small aquatic life of Stellenbosch's Eerste River. King says the Institute's interest focused simply on how much food was available for Black duck along the river, but she followed the advice of her mentor at UCT, Prof George Branch, closely – "you will never understand an ecosystem unless you analyse it at the species level," he said. With no freshwater ecologists initially at UCT to guide her, she conducted a meticulous and detailed study of the river, learning how to identify all the small aquatic species and noting how these changed along the river and through the year. Eventually she understood the river and a lifetime's dedication to the welfare of rivers followed.

She completed her PhD in 1983, with two babies born along the way. By this time two more freshwater ecologists, Profs Bryan Davies and Jenny Day, had arrived at UCT. Together, the trio founded the Freshwater Research Unit where King would remain Principal Researcher for almost three decades. She was funded initially by CSIR's Foundation for Research Development (FRD, now the National Research Foundation) to do fundamental ecological research, the beginning of a career conducted entirely on 'soft' money with no appointed employment.

In 1988 change was on the horizon, not only for King, but also for South Africa and the field of freshwater management. There was increasing concern over the state of South Africa's rivers. In the Kruger National Park and elsewhere rivers were degrading severely as urban and agricultural development blossomed. Here and internationally, people started questioning how much water should be left in river ecosystems targeted for development, in order for them to continue as healthy ecosystems. Added to this, changes to the FRD funding model forced King to seek elsewhere for research funds.

She and her colleagues turned to the WRC, which was not funding ecosystem research at that time. Needing to propose research with a management focus, she approached them with a proposal on a topic so obscure that it did not yet have a scientific name – how much water does a river need? Isolated scientifically because of apartheid, South Africa was nevertheless registering both locally and globally that the world's rivers were in trouble. The WRC accepted the proposal and tasked King to research world trends on the topic and then make recommendations as to what South Africa should do. The work would become part of the global scientific endeavour that led to the discipline of Environmental Flow Assessments. This discipline now plays a crucial role in guiding governments in their management of river basins.

Back then she was, she says, a young mother with hardly any relevant science behind her, and scant understanding of the topic. There were no textbooks or manuals and barely any thinking and concepts to support the work. Those available were from industrialised countries focused more on maintaining game fish, such as trout. They were not addressing the issue so important to South Africa – maintaining healthy river ecosystems to support people's livelihoods and biodiversity in all its forms. With very little to guide them on how to do it, she and her PhD student, Rebecca Tharme, set off in UCT's Zoology Department four-wheel drive truck and disappeared down the dirt roads launching their mission to figure out how much water a river needs.

Setting in place the building blocks for ecological flow measurements

The road to success was bumpy. The first time King recommended an environmental flow (for the Lephalale River) to the Department of Water Affairs, they replied that she had asked for more than the natural flow of the river. Back to the drawing board!

She remembers her early WRC steering committee meetings as challenging, partly because she didn't yet understand the necessary engineering terminology, but she persevered. She was boosted by unwavering support from the WRC and the then-Department of Water Affairs and Forestry (DWAF), with the WRC specifically nurturing and believing in her. This gave her the determination to continue until she got it right.

To help King gain insights of this new water-management world, she attended hydrology symposia and remembers one symposium very well. As she rose to present her paper, the session chair explained there were three great lies in life: the cheque is in the post; I'm from Head Office, I'm here to help you; and… some of his best friends are ecologists. To hoots of laughter many left the session leaving King to present to a greatly depleted audience. Undeterred, a couple of years later that session chair was the co-author of her next paper. In 1995, she was awarded Best Paper at the Queensland Hydrology Symposium in Australia.

King pointed out to water managers that there is no magic number that represents the amount of water that should be left in a river. Rather, as we change its natural flow, sediments and water chemistry the whole river ecosystem will respond by changing also. It becomes a choice of society what that future river should be like. There will be a tradeoff between the natural attributes of the river system that could be lost and the artificial benefits (like food, jobs and energy) that could be gained.

In work that was completely new in the 1990s, King, DWAF and the WRC brought together interdisciplinary teams to address the topic for river after river across South Africa that were targeted for dam development, honing their skills and methods as they did so. Experts in hydrology, hydraulics, geomorphology, sediments, water quality, fish, invertebrates, birds, trees, resource economics, and social structures and cultures provided input. Key to the process was King's realisation in the early-1990s that the social and ecological consequences of the development of water resources should be addressed at the same level as the engineering and economic aspects, so that decision-makers can assess the full spectrum of costs and benefits before making a decision. Looking after people is not just a matter of providing them with water from a tap. There is a myriad of benefits provided by healthy rivers that could be lost, such as natural flood storage, water purification, fish, firewood, medicines,

Dr King with Phana Chheng, her Mekong River Commission driver film maker and eventually adopted son on the Tonle Sap.

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"The overall health of the living river was a crucial aspect for us because of the role that rivers play in our peoples' lives."

construction materials, water for washing, tourism income and cultural importance and much more.

"This," King says, "is where we began to diverge from the industrialised countries also starting to tackle the problem of degrading rivers. The overall health of the living river was a crucial aspect for us because of the role that rivers play in our peoples' lives."

The result was the Building Block Methodology (BBM), which recommended how much water should stay in the river to achieve different levels of ecological health. With King as main architect, it was the first method in the world that offered both a holistic assessment of the whole river ecosystem and a manual to explain its use. It became an international benchmark for instream flow assessments in the 1990s because of its simplistic approach, and had profound ramifications in South Africa where it led directly to the inclusion of environmental protection (in the form of the Ecological Reserve) in the 1998 National Water Act. For this and other reasons, the Act was seen globally as one of the most advanced and visionary in the world.

Next steps in predicting the effects of changing river flow

By the late nineties, King had moved on, developing with colleagues Drs Cate Brown and Alison Joubert the DRIFT (Downstream Response to Imposed Flow Transformation) eco-social model.

This includes a strong socio-economic component for predicting the impacts of changing rivers on peoples' lives. Importantly, DRIFT addresses many of the shortcomings of the BBM, offering scenarios of different levels of development/management, rather than recommending how much water should be allocated to the river.

It was an important shift as it allowed us to start making neutral predictions of the impacts of a range of development and management options, King says. These are communicated in a simple way that can be understood by a wide range of stakeholders, not just decision makers. "Now everybody has a chance to see those possible futures, and negotiate for the one that they want."

"In the end, the decision makers decide, but we've given them the chance to see both sides of the development picture. We hope this will lead to more informed and balanced decisions about dams and other developments than was possible a decade ago." That's the way we've been working for the last 20 years and, she says, it is working beautifully, rapidly gaining international traction.

DRIFT is now commonly seen as the most structured, detailed and technically advanced of the environmental flow methodologies globally. It is a step up from the early holistic methods because it centres on ecosystem and social modelling, and the DRIFT model now takes its rightful place alongside hydrological, hydraulic, economic and other models in water-resource planning.

Since those uncertain first steps in South Africa, King has advised on environmental flows in over 20 countries, constantly developing and refining her work. In 1997, she led the environmental flow assessment for the Lesotho Highlands Water Project in the first international application of the DRIFT methodology. According to the World Bank, it resulted in the first recorded recognition globally of the rights of downstream communities to compensation for declining river health.

Dr King with local children at the Usanga wetlands, Tanzania in 2009. She has undertaken environmental flow assessments around the world.

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Dr King receiving the Stockholm Water Prize from the King of the Sweden, in 2019.

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South African scientists, led by Dr King, with their security team for field work during the Kishenganga Court case.

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Since 1997 King has led scientific teams working on environmental flows and river system management for the Pungwe River in Zimbabwe, parts of the Zambezi Basin (Kafue and Luangwa), the Pangani Basin in Tanzania, the Okavango River system (Angola, Namibia, Botswana) the Indus headwaters (Pakistan), the Lower Mekong (Lao PDR, Thailand, Cambodia and Vietnam), and more. She has done similar work for the World Commission on Dams, IUCN, WWF, and has worked ***inter alia*** in Taiwan, Ethiopia, Costa Rica, USA, Guatemala, Australia, Mozambique, and the UK.

She was global Team Leader of the World Bank Advisory Group on environmental flows from 2000 to 2003, before taking the position as scientific consultant on integrated flow management with the Mekong River Commission.

From 2009 to 2014 she acted as scientific advisor to the Government of Pakistan in a dispute with India over the Kishenganga Dam in the Himalayas. King points to the phone next to her front door at her Bergvliet home. It rang in the middle of the night a few winters ago, she says. “A voice said: Dr King, this is the Government of Pakistan. We’re having a border conflict with India. Can you please help us?” I thought somebody was joking, she says, but the call led her to serve as expert witness at the Pakistan v India court case at the Permanent Court of Arbitration (PCA) in The Hague in August 2012.

It also led to the DRIFT Methodology being approved by the PCA as an appropriate tool in transboundary conflicts of the magnitude and complexity of the one under their consideration. Indeed, this was said to be the biggest potential conflict between India and Pakistan since partition in 1947.

A moment of reminiscence at the Bergvliet home

King says she is happy with the advances she has helped bring about. “People are stopping, thinking and treading forward more carefully today. To see my work become part of the body of knowledge in the world, to see my words used in other people’s papers and arguments, is satisfying.”

“Follow your dreams and if you are lucky you will end up being paid to do what you love. ”

She is very proud of the fabulous bunch of scientists she has helped train, now roaring past her in the fast lane and working across the world.

Dr King’s words of wisdom for young people

- Follow your dreams and if you are lucky you will end up being paid to do what you love.
- In your work, reach beyond your grasp, and soon what you reach for will become normal and easy. Then reach again and again.
- Just keep going. Failure is not trying, rather than not succeeding.

Still involved in her work through her younger colleagues she also makes time for other endeavours. She is a SANParks Honorary Ranger, and recently led a team creating a detailed online course on Table Mountain National Park for the organisation. She is an international member of the American Academy of Arts and Sciences (AAAS), and Senior Scientific Advisor to the International Crane Foundation.

But there is another project simmering. King is using her prize money from the Stockholm International Water Institute to launch the Africa’s Living Rivers Project with close colleague Cate Brown. There are six modules to the project, including upgrading the DRIFT model in partnership with global water company Xylem; WRC-funded development of generic algorithms for DRIFT; and a module close to her heart called ‘The silent voices of rivers and their people’. This initially focuses on the Luvuvhu River in Kruger National Park and the Makulele people who were displaced from the area when Kruger was expanded but have now reclaimed it. The story of the people’s loss and gain of their land, linked with the loss and gain of a river that died but was revived by science, environmental flows and the National Water Act, is a story of South Africa’s history and of hope.

If she could encapsulate her work, King would say she has tried to ensure that all uses of river systems are brought into decisions, and the concept of no net harm adhered to. Future decision makers have been given the opportunity to acquire a more balanced set of information than was available in the past and to be able to explore more deeply the implications of their decisions. They should not need to face ecological and social tragedies and say “I did not know this could happen”. King says “I am not pro-development or anti-development. I just want to make sure that they know all the implications before making decisions.”

Dr King speaking at the Opening Plenary of the Stockholm Water Week in 2019.

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Dr King on how to achieve success in your career

- Know your discipline – deeply
- Believe passionately in what you are doing – you will do more than you are ever paid for!
- Seek a common language – communicate widely and effectively
- Do your homework before meetings – most people do not
- Look for solutions, not just problems
- Stand your ground, be firm – do not retreat in the face of opposition or rudeness
- Show courtesy and respect to all