

**Standing Committee on Rural and Regional Affairs and Transport Inquiry:
Additional Water Supplies for South East Queensland – Traveston Crossing Dam.**

The following submission from Prof Jean Joss concerns the EPBC Act protected lungfish, *Neoceratodus forsteri*, and aims to provide information as to why these fish are so scientifically important and why a megadam on the Mary River could be so disastrous for them:

The backboneed land animals or tetrapods, the group to which all amphibians, reptiles, birds and mammals including ourselves belong, evolved from a group of fish about 370 million years ago. Our direct fish ancestors are long since extinct, but our closest living relatives among modern-day fish are a group called the **lungfish**, which have a long fossil history, reaching back more than 400 million years. Today there are only three kinds of lungfish: one in South America, one in Africa and one in Australia. All live in warm fresh waters and all breathe air. The South American and African lungfishes are strange larval-looking creatures, greatly modified by evolution, but the Australian lungfish is much more primitive (i.e. has a lot of ancient characteristics) and still resembles our own fish ancestors quite closely.

Scientists who study the evolutionary step from water to land usually have to make do with fossils, which often raise more questions than they answer. With the Australian lungfish we can study the whole living organism: genes, development, physiology, anatomy, behaviour, the lot. Because of this it is very valuable to scientists who study fossils of the earliest land animals and their fish ancestors: it provides a living model that helps paleontologists to understand the anatomy of the fossils, and allows them to answer questions about, for example, the genetic basis of some of these structures. The Australian lungfish thus gives us a unique window on our own distant evolutionary past. It is also worth noting that fossils of the present-day species *Neoceratodus forsteri* extend as far back as the Cretaceous, probably making it the oldest vertebrate species in existence. To describe it as "scientifically invaluable" would be an understatement.

The Australian lungfish occurs naturally in only two rivers in Queensland, the Mary River and the Burnett River. It has been introduced into several other waterways but with no lasting success. Three years ago the Queensland and Federal governments approved construction of a dam on the Burnett River despite protests that this would endanger the lungfish. This dam was completed in late 2005. Now, the Queensland government has approved a dam on the Mary River. This means that the last remaining undamaged lungfish habitat is about to disappear, and that this wonderful animal - whose lineage is far older than the dinosaurs - faces extinction. The problem is that the lungfish need shallow areas of slow flow with lots of water vegetation to breed, and these areas disappear in dams because the water level fluctuates too much. Downstream of the dam, reduced flow also leads to the drying out of established breeding areas, and because lungfish are very loyal to their old breeding sites - they often simply cease to breed if their old sites are lost. If they cannot breed, the population eventually dies out, although this will take many decades as lungfish have a life span similar to our own. Proposed "state-of-the-art fish elevators" to allow lungfish past the dam will do nothing to redress

the loss of spawning/nursery areas, and are thus unlikely to halt the slide towards extinction if the Mary River dam is built.

But all is not yet lost: the lungfish is a protected species under the *Environment Protection of Biodiversity and Conservation Act 1999* (EPBC Act), and it is possible for the Federal Minister for Environment and Heritage to deny approval of the dam to the Queensland State Government. Our lungfish is currently listed as "vulnerable"; the completion of the Mary River dam would almost certainly push it to "critically endangered", and in the long term will lead to its extinction in the wild. Needless to say the dam will not just affect the lungfish but will also disrupt the ecology of the whole Mary River valley, which includes other important Gondwana relicts such as Mary River turtles and cod. Both the Mary River turtle and the Mary River cod, as their names suggest, are endemic to this river and both are listed as 'endangered' on the federal EPBC Act.

The issues around the Mary River dam are thorny: the proposal is a response to the acute water shortage in south-east Queensland, and the water supply problems certainly need to be solved, but the extinction of the lungfish would be both a scientific catastrophe and an indelible stain on Australia's conservation record. It must not be allowed to happen. Being well aware of Queensland's water problems, ex-president Gorbachev during his visit to Brisbane last year, cautioned the Premier of Queensland Peter Beattie about the likely negative environmental effects of large dams such as the proposed Traveston dam on the Mary River, to "tread carefully" with the building of dams (*The Age*, 24 July, 2006). More than 100 concerned scientists, including Lord May of Oxford (former Chief Scientific Adviser to the British Government and former President of the Royal Society) from universities and institutions all around the world, have already written letters of protest to then Minister Campbell and Premier Beattie, and the threat to the lungfish was the subject of a highly critical editorial in the world-leading science journal *Nature* (20 July 2006). A recently launched web petition attracted over 4,000 signatories in its first week. (<http://www.thepetitionsite.com/takeaction/610807318>)

There is a unique significance to the Australian lungfish that would render its extinction both a scientific and an environmental tragedy. Australia holds this inestimable living treasure in trust for the world. Despite the acute water crisis facing south-east Queensland, the Government of what describes itself as the 'Smart State' has a clear moral and scientific duty not to drive the Australian lungfish to extinction. If the Queensland Government will not take the necessary steps to protect this species, then the Federal Government must intervene.

The take-home message is very simple. *Neoceratodus forsteri* is a species that provides unique scientific evidence for how our own distant ancestors made their way onto land. It is a scientific treasure that Queensland (and Australia) holds in trust for the whole world; the Mary River dam will destroy its spawning and nursery habitat and threaten it with extinction; and this will be a scientific scandal that the scientific community will neither forgive nor forget, and which will permanently stain Australia's conservation record in the eyes of the world.