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## BOOK REVIEW

**Turpin, T. 2008. Dam.** London, UK: Reaktion Books. ISBN 9-781-86189-328-4, 256 pages, UK£16.95 / US\$27

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Politicised and bureaucratised, problematised and polarised... vilified and glorified, dams are an emotive issue that epitomises the dilemma found at the heart of development.

In *Dam*, Trevor Turpin traces the global history of dams. Interweaving innumerable case studies with the personalities of those designers and engineers who saw the projects to completion, the book explores the function of dams in their various forms, and the technological breakthroughs that have enabled dams to be built on an ever growing scale and with ever growing ambition. The book documents the impacts of dams on the environment and people and the passionate opposition that dams have evoked, as well as how some dam proponents have sought to minimise impacts through policy and legislation – with varying degrees of success. Beyond the polemic of the pro-/anti- dam debate, which Turpin carefully avoids taking sides on (this is the book's strength and weakness), the book contemplates the aesthetics and the symbolism of these monuments of the modern world, as well as their periodic appearance as key characters on the global political stage.

The book's first chapter chronicles how, where, and why dams have been built. Systematically considering dams built for irrigation, navigation, water supply, flood control, power generation, and for multiple purposes, the book draws on many examples of prominent and lesser known dams from around the world. Examples range widely, incorporating historical firsts and world's largest, from small 18th century earthen dams plumbed into Britain's canal network and that contributed towards the country's industrialisation, to the world's largest and most infamous project, China's Three Gorges dam, that through controlling the Yangtze river's flooding incurred massive social and environmental impacts that match the scale of the dam itself.

The evolution of dam design, engineering theory, and construction techniques and technologies constitute a core theme of the book. Turpin marvels at the ingenuity and evolution of dam design as engineers pushed technological and organisational limits in their quest to economise on time, labor and materials, and to build dams in ever remoter and more rugged locations. The reader is left with equal appreciation of the invention of waterproof 'puddle clay' in the 1760s that filled the core of many early dams, alongside modern concrete constructions that allow dams hundreds of meters in height to be built. Likewise, the reader also appreciates the importance of the mechanisation of construction, with the transition from pick and shovel to steam-powered shovels, from gun-powder to dynamite, and from horse-power to narrow-gauge railways and earth-moving machinery.

Throughout the book, Turpin pays his homage to engineers' inventiveness and determination, and it is here that the book is at its most fascinating. The dam pioneers were largely practical men – Thomas Telford, Sir Robert Rawlinson, and William Jessop amongst many others – whose personalities are inextricably interwoven within the dams themselves and whose single-mindedness brought many a project from concept to completion. Turpin quotes, for example, Frank T. Crowe, General

Superintendent of the six company consortium that built the Hoover dam: "I was wild to build that dam – it was the biggest dam ever built by anyone, anywhere".

The book brings to life some of these extraordinary characters, such as the 'colonial misfit' William Willcocks, who designed and partially supervised construction of the first Aswan dam on the Nile, for which he was knighted. Yet Willcocks' increasingly vitriolic disagreements with his colleagues first saw his resignation in 1897 and then, as Willcocks doggedly criticised plans to build further irrigation infrastructure on the Nile, he was charged with criminal slander and libel in Cairo's Consular Court 24 years later.

Turpin also highlights how design theory evolved alongside practice – lagging at first, but leading from the 1930s onwards as theory proved its benefit in terms of economical use of labor and materials. It is surprising to learn that dams have only really been 'designed' since the 1860s, with earlier engineers depending primarily upon their judgment and practical experience. The contribution of noted engineering theorists are documented, including Professor WJM Rankine whose theories included the use of sheep to puddle clay in 1862, and Karl von Terzaghi whose *Principles of Soil Mechanics*, written in 1926, founded the field.

Turpin considers next whether, beyond functionality, dams and their reservoirs can be objects of aesthetic beauty or can even enhance the landscape. Turpin traces tastes in dam design from an initial failure to even take aesthetics into consideration, to monumentalism where dams were designed to contrast strikingly with their environment, to conservation where harmony with the surrounding landscape was aspired to. Implicit to this shift was the recognition that aesthetics were within the scope of an engineer's work, and that landscape architects and environment specialists should support the civil engineer's work. More recently, Turpin observes (perhaps with a little dismay) that dam design has shifted almost to apology. To this, I would add that they have also often become a guarded state secret.

A striking example of dam monumentalism that Turpin explores in detail is the Hoover dam, a dramatic Modernist titan of a dam that captured the zeitgeist of 1930s America. Franklin D. Roosevelt articulated the intended impression in his address at the dam's opening: "I came, I saw, and I was conquered". The design of the Hoover dam irrepressibly conveys the pride and prestige of the project. Flagship mega-dams have evoked similar passions amongst leaders around the world: Lenin's Dneprovsk dam (1932); Nehru's Bhakra dam (1954); and Nasar's High Aswan dam (1970).

Turpin also reflects upon the symbolism ascribed to dams – power, strength, achievement, domination, and even civilisation – noting that this symbolism is not always complimentary. The Hoover dam, for example, epitomises the control of nature and the 'industrialisation of rivers' in the US. In 1928, the US Bureau of Reclamation, charged with building the dam, declared that this "mighty river, now a source of destruction, is to be curbed and put to work in the interests of society". Unfortunately, Turpin doesn't mention the impact of the dam on the Colorado River's once rich fisheries and on its delta in Mexico, which has been turned into a nearly-sterile salt flat.

Exploring dams as symbols of political power and dominance, Turpin first turns to the Elan Valley dams located in Wales and built in 1904 to supply water to the city of Birmingham in England. These dams came to symbolise to many Welsh the dominance of the English. Taking a second case, the High Aswan dam on the Nile, built as the Cold War began to escalate in the 1950s, became a symbol of Russian influence and power in Africa, as well as Soviet association with anti-colonialism.

Recognising the controversial nature of dams, Turpin next considers peoples' opposition to dam-building, which he seeks to link to an increased appreciation of the environment by poets, philosophers and activists since the late 19th century. Turpin details some key milestones of the anti-dam movement, including John Muir's efforts (ultimately defeated) to protect the Hetch Hetchy valley of Yosemite National Park from dam development, and the determined Narmada Bachao Andolan movement who have fought for years against the continual raising of the Narmada river's Sardar Sarovar dam height in Gujarat State of India, as it slowly submerges the land that is their means to livelihoods and promises for resettlement programs are continually broken.

The story of the vindictive Brigadier-General Lewis A. Pick exemplifies the human cost and injustice that can be wrought by dam development. Humiliated in a public meeting by Native American Chief Thomas Spotted Wolf who accused him that "You have come to destroy us", Pick actively ensured minimal compensation for the Three Tribes when their traditional lands and homes in North Dakota were flooded by the Garrison Dam in 1954. The Three Tribes way of life was almost completely destroyed by the dam and it took over a generation for the tribes to show signs of recovery.

Turpin next turns to the politics of dam development, such as the infamous 'Iron Triangle' that exists between politicians, dam promoters and dam contractors, although gives less attention to this key issue than it arguably deserves. Turpin illustrates dirty dam politics through the case of the Pergau dam and the Aid and Trade Provision Agreement between the UK and Malaysia signed in 1988. This agreement controversially channeled British aid to build the Pergau dam in Malaysia in the early 1990s after Malaysia purchased £1 billion of arms from the UK. It is somewhat surprising, however, that Turpin doesn't refer to the wider corruption that notoriously plagues the dam-building industry.

In the book's final chapter, Turpin explores how dam engineers have sought to address social and environmental issues through Environmental Impact Assessments, the emergence of environmental protection legislation and institutions, codes of ethics, and global processes such as the World Commission on Dams. Turpin acknowledges that despite the increased involvement of ecologists, fisheries experts, town and country planners, and other experts in the dam-building industry, these legislative and institutional innovations haven't been the panacea that was hoped for: "It is still seen as the engineer's duty to find the most suitable site with maximum capacity at least cost – the need to also cause minimal environmental impact has been slow to form part of the promoter's Terms of Reference".

Turpin's book is very readable and in only 256 pages encompasses a remarkable depth and breath of the history and context of dams in their multiple guises. The book is richly illustrated with photographs of the dams and images of posters and other historical materials. The book will be of interest to engineers, academics, and environmentalists, as well as the general reader.

Throughout the book Turpin seeks to give the impression of even-handedness, although in this reader's opinion many value judgments beg to be more explicitly stated. Dam development is not a neutral management issue. It reflects individual and societal values and beliefs about the world in which we would want to live. The injustice of the privatisation of the commons, the inequality created between those who benefit from dams and those who pay the price, and the lack of voice of those people whose lives are placed in turmoil – even if it is in the interest of wider society – rightly should make the blood boil.

Turpin states that without dams "vast numbers of the earth's population would still be walking many kilometers for water, would starve, would suffer from disease brought about by inadequate sanitation and would be subject to regular flooding". Yet, the book is at its weakest in recognising the politicised nature of dams and in particular the decision-making process that surrounds them. It is this reader's opinion that, especially today, many destructive dam projects move ahead even when better options exist because of dirty politics and the lack of transparency, accountability, and good governance of the hydropower industry and government decision-makers. This is especially the case in under-developed countries where many future large and exceptionally destructive dams are proposed. Global concern over climate change is also taken as a justification by the hydropower industry to revive itself, the politics of which leaves little space for discussion about alternative viable choices that exist. Whilst many dams constructed in the past may have made sense in their historical context, new technologies and a deeper understanding of dam's environmental and social costs mean that large dams – which destroy vast swathes of river ecosystems and the livelihoods of those dependent upon them – are increasingly an outdated technology. Instead, the benefits that healthy free flowing rivers bring to people and the planet need to be fully recognised.