CREW
centre of expertise for waters

A review of the arguments relating to bulk export of water

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This document was produced by: Andrew Cuthbert, the James Hutton Institute, Craigiebuckler, Aberdeen, AB15 8QH

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1.0 INTRODUCTION

Technically, water export or long distance movement of water is feasible and has been carried out throughout history. For example the Romans built their first Aqueduct (Aqua Appia) in 312 B.C, and records indicate aqueducts were in use in Assyria around 690 B.C. Various methods are currently in use or being planned to distribute water over long distances. These include, pipelines, aqueducts, canals, road or rail tankers, ship tankers and barges and large bags towed behind boats.

There is very limited up to date robust and impartial evidence relating to bulk export of water, consequently much of the information presented here is International in its nature. This document reviews the available information and summarises the arguments for and against, providing examples where possible.

2.0 ARGUMENTS IN FAVOUR OF BULK EXPORT OF WATER

1. Due to climate change and increasing demand, water is becoming increasingly seen as a financially exploitable resource which could provide a valuable source of income for a water rich nation. For example:

    - Israel had planned to import 1 billion m^3 of water, or 50Mm^3/year, at \$0.75/m^3 (£0.47/m^3) from Turkey over a period of 20 years – an amount equivalent to 2.5% of Israel's annual consumption of fresh water. The deal was reported to be worth between \$800 million (£506 million) and \$1 Billion (£633 million) (Global Water Intelligence, 2002). This agreement has since been abandoned by Turkey.
    - In 1986, an agreement was signed between Lesotho and South Africa to proceed with the Lesotho Highlands Water Project for the transfer of water from Lesotho to South Africa. By the end of 2002, the total volume of water delivered was 2,278 million m^3, generating royalties of ZAR 863million (£65 million). The water royalty in 2002-03 contributed 6.4% of the Government of Lesotho's budget.
    - In Kings County, California, USA, a landowner was reportedly planning to sell 14,000 acre-feet of water a year to the Mojave Water Agency in San Bernardino County for \$5,500 (£3,430) per acre-foot which equates to \$77 million (£48 million) per year.

2. Exporting water could provide employment, and there is interest from entrepreneurs and businesses for water exports to go ahead. For example:

    - In the (since abandoned) deal set out above between Israel and Turkey, Israeli companies reportedly won infrastructure contracts worth \$700 million (£443 million) to facilitate the water export (Global Water Intelligence, 2002).
    - Sitka and Alaska Resource Management LLC, the partnership formed by the two companies, are seeking to be the first to introduce bulk supplies of freshwater, transported in huge tanker ships, as a new commodity in global trade (Walton, 2010 and Katz, 2010).
    - In 1998, in Ontario, Premier Mike Harris issued a permit to the Nova Corporation to export water in tankers to sell on the Asian market. This permit was later cancelled (See Arguments against water export No. 9).
    - In 2006, an entrepreneur from Kamloops British Columbia (B.C), applied to the B.C. government for a licence to drain one million imperial gallons of water a day for export to the Middle East. The proposal was withdrawn (See Arguments against water export No. 9).

3. Water rich nations could be seen to have a humanitarian responsibility to ease the suffering of communities lacking in water. The access to clean drinking water is a Human Right, and despite water export being prohibited in Canada, MacNab (2006) poses the following: does Canada have an international humanitarian obligation to provide water to those regions that are lacking; and, if a region becomes dependent on Canadian water, would Canada have a moral obligation to continue the supply when domestic circumstances change? Exceptions to the prohibition of water export do exist in some regions in Canada. For example in Quebec, there is a general exception allowing the government to allow transfers on the basis of urgency or for humanitarian or other public interest reason (Saunders, 2000). The same is true in a number of other Canadian regions (See Table 7, Katz, 2010).

4. Trading and exporting water can improve relationships, build networks and alliances and increase the regional influence of the source nation. Katz 2010 argues that natural resource trade and cooperation between countries has been the historical norm, and a main stay of peaceful relations between countries.

3.0 ARGUMENTS AGAINST WATER EXPORT

1. Water, although appearing abundant at present may not always be so. A nation's own economic development, population growth and the impacts of climate change could result in water becoming less abundant in future. Climate change, population growth as well as increased internal demand by industry may require a currently water abundant nation to preserve its own resources for the benefit of its prosperity and growth. The source nation needs to consider its future water resource requirements.

2. Moving water can be very expensive, both in terms of initial set up of the transportation network and also during operation and maintenance. For example:-

   - Turkey and the Turkish Cypriots plan to construct a 107 km underwater pipeline which will eventually pump 75 million m^3 of drinking water to Cyprus. The cost of this project is reported as being $478 million (£302 million) (Tokyay, 2012).
   - According to Zhou (2004) water transport costs range from a few cents per cubic metre to over a dollar. A 100m vertical lift is about as costly as a 100 km horizontal transport at $0.05 – $0.06/$m^3$ (£0.031 - £0.037/m^3). Other figures published suggest that pumping 480 m^3 of water a height of 100m requires 200 kilowatt-hours of electricity, which, at a price of approximately 10 cents (6 pence) per kilowatt-hour, would cost $20 (£12.6) (Clark, 2007). The figure of 6 pence per kilowatt-hour would appear to be much less than current UK energy prices, 8 to 9 pence per kilowatt-hour is likely to be a more accurate figure.
   - It has been suggested that the Bahamas Water and Sewerage Corporation paid about $0.6/$m^3$ (£0.38/m^3) for production and receiving facility charges to a company based in Burmuda. It cost a further $0.89/$m^3$ (£0.56/m^3) to ship the water 60 kilometres, for a total cost of $1.50/$m^3$ (£0.95/m^3) (article 2005).
   - The upgrade of the Loch Katrine to Glasgow water transport system, which was required due to more stringent water quality standards coming into force, is reported to have cost >£100 million and resources invested into the option selection stage is reported to have involved some 175 personnel, comprising of 25 different technical disciplines, which have spent in excess of 100,000 man hours (Adamson, Date Unknown).
   - The cost of Israel importing water from Turkey was reported to be around $0.75/m3 (£0.47/$m^3$) (Global Water Intelligence , 2002).

- For ocean going tugs at 5000-6000 horsepower, the estimated cost of a tug and bag system is about $5000/day (£4019/day) and $30,000/day (£24,118/day) for tankers (Davidge, 1994).

3. Negotiations to set up bulk export of water can be difficult and protracted. For example, the agreement between Israel and Turkey announced in 2002 was reached after 3 years of negotiations relating to the establishment of a joint committee to discuss the price of imported water, the cost of transportation, and the division of risk between the two governments. It was then abandoned after a "political" incident.

4. The construction and operation of water transportation systems have a high energy and fuel requirement which would release significant greenhouse gas emissions into the atmosphere. No quantitative evidence was found on this, but it is likely that emissions would add to the already high emissions associated with water industries. For example, in a report published by the Environment Agency in 2008, supplying 1ML of water was said to have produced the following greenhouse gas emissions between 2004 and 2007:-

   - 2004/05 = 0.249 tonnes.
   - 2005/06 = 0.289 tonnes.
   - 2006/07 = 0.271 tonnes

5. According to the report of the Ministerial Committee to the Newfoundland and Labrador Government (2001), the environmental impact of any bulk water removal is dependent on the location of the project. However, damage to the environment and cultural heritage could occur through construction works, production of waste, and damage to habitats and archaeological sites. Pollution to the water environment, land and air can occur, and communities may be subject to noise, dust and vibration pollution.

6. Extracting large volumes of water from an aquatic system could damage the water balance and ecology as well as impacting on communities who depend on the water and its associated benefits. For example, the depletion of river flows have severely damaged river deltas and local communities, such as in the Sacramento/San Joaquin delta in California, the Nile River delta in Egypt, and the Colorado River delta in Mexico (Gleick. 2002). Lake Chad which is bordered by Chad, Niger, Cameroon and Nigeria, shrank in volume by 90% between 1963 and 2001 reportedly due to climate change and overuse/extraction. As a consequence, fish production has declined 60% as has biodiversity. If this Lake was lost, the livelihoods of 30 million people could be affected. As a consequence, proposals have been submitted to divert water from Oubangui River, which is the major tributary to the Congo River; however the impact on the Lake as well as the Congo River has yet to be ascertained.

7. The construction of water transport system can cause significant disruption to transport infrastructure and communities, potentially causing traffic congestion and property damage/loss, causing resentment and hostility to the project by members of the public and businesses.

8. Although employment may be created as a result of the decision to export water, jobs and businesses in other sectors may suffer as a result. In addition, the potential for significant job creation as a result of the development of water export is questioned by some (Larson, No Date).

9. In general public opinion on water export appears to be split and varies depending upon location and motivation. The same can be said about expert opinion. The evidence reviewed here appears to

suggest greater opposition than support, although this may be due to the opposition being more vocal.

- It is reported by the Polaris Institute that in a 2002 survey conducted by the Centre for Research and Information on Canada, 69 % of Canadians were opposed to bulk water exports.
- Following the 2006 application to the British Columbia (B.C) government for a licence to drain one million imperial gallons of water a day for export to the Middle East by a Kamloops entrepreneur. The proposal was withdrawn after strong opposition by the B.C.
- Public outcry forced the Ontario government to cancel a permit issued in 1998 by Ontario Premier Mike Harris to the Nova Corporation to export water in tankers to sell on the Asian market.

10. Once export has begun it can become considered a commodity or a good/product and reversing the decision may be problematic due to trade agreements and national/international law (report of the Ministerial Committee to the Newfoundland and Labrador Government, 2001).

4.0 ALTERNATIVES TO WATER EXPORT

Desalinisation of salt water may be an alternative to bulk export of water. In an article published in 2005 figures suggested that desalinisation costs had lowered to \$0.6/m^3 (£0.38/m^3), and Zhou (2004) suggests a cost of between \$1/m^3 and \$0.6/m^3 (£0.38/m^3 and £0.63/m^3) depending upon method (i.e. thermal methods or reverse osmosis) and water type (i.e. brackish or seawater). Karagiannis *et.al* provide further costs, including figures of up to and above 9 Euro/m^3 (£7.23/m^3) for desalinisation of seawater in a plant with a capacity of <1000m^3 per day. Costs appear to reduce as capacity and volumes increase. The competitiveness of desalinisation in comparison to bulk water movement appears to vary depending upon the water transport method, distance to transport the water, energy prices and geographical location, with some suggesting it can be cheaper and other suggesting it can more expensive (Walton, 2010 and Mayrand, 2008).

Measures which could be considered more sustainable including improved efficiency in distribution networks i.e. reducing leakage, encouraging reduced water consumption and the use of grey water systems etc. are also options which should be considered.

Note: Cost conversions from US $ to UK £ has been undertaken based on an exchange rate of UK 0.63, ZAR to UK £ on an exchange rate of UK 0.076 and Euro to UK £ on an exchange rate of UK 0.8.

5.0 COMMON CARRIAGE OF WATER

Common carriage is the shared use of water supply pipes and infrastructure of an existing statutory water undertaker's distribution system by a third part, in order to supply water to the third party's customers at another point in the system (DWI, 2004). It was introduced in the Water Act 2003 as a means to increase competition within the Water Industry within England and Wales.

Common carriage is prohibited in within Scotland under Water Services etc. (2005) Act, the Act does however, allow Scottish Water to share (or 'trade') water resources with its neighbours if it so chooses (Water Industry Commission, 2012). As a consequence, water transfer from Scotland to England would be possible.

The Crew team submitted an enquiry to the Office of Water Services (OFWAT) requesting further clarification into the potential role of Common Carriage as a means to address water shortages within the UK. OFWAT provided the following response by email on 21/06/12. *'In answering, we interpret this term as a third party having access to water companies' pipeline systems to transport its water, and we haven't made a distinction between common carriage and contract carriage.*

Availability of infrastructure

Transfers between neighbouring companies, and possibly a chain of transfers so A providing water to B means that B has spare water to transfer to C, could be a viable way of resolving water shortages, and we are working to enable this, where it is an efficient solution. However, the degree of connection between companies is limited and longer-distance transfers are likely to use a combination of rivers such as the Severn and infrastructure such as pipelines, aqueducts or possibly canals. There is no suitable river or infrastructure between Scotland and England, and a pipeline would be very expensive to build and operate.

Access to infrastructure

Under current legislation, a 'combined licence' allows a licensee to put treated, potable water into a water company's system to supply its own retail customers (or itself). If there is a connection with a neighbouring company, it can also put the potable water in there. It would be difficult to put together a chain of such connections. The restriction to potable water supplies is significant, because many connections (and rivers etc.) carry raw water and so access to treatment capacity is needed and current legislation does not require companies to provide this. However the Government has announced a new Water Bill that would require companies to allow access to treatment (under appropriate conditions). '

Costs and access terms

As indicated previously, the costs of transferring water long-distance by pipeline are very high and bringing water from Scotland is unlikely to be an economic way of providing water to Southern England. Even if it were, the current access pricing regime would make it difficult, but if the forthcoming Water Bill passes we will be able to ensure prices allow access where efficient and economic. Currently access has to be negotiated with each company, making the process very difficult, but the Bill provides for regulated access on standard, published terms including prices (OFWAT, 2012)

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CREW Facilitation Team

James Hutton Institute
Craigiebuckler
Aberdeen AB15 8QH
Scotland UK
Tel: +44 (0) 844 928 5428

Email: enquiries@crew.ac.uk

www.crew.ac.uk