

Input to deliverable 6.1.5-6 Comparative Analysis of Enabling Factors for Sustainable Urban Water Management

## Case study brief – The restoration of the river Cheonggyecheon, Seoul



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## **Introduction**

The relevance of the case of the restoration of the river Cheonggyecheon in Seoul lies not in the 'how' question but in the 'why' question. The 'how' question is easily answered, and the answer is that the situation was probably atypical: an elected Mayor with considerable financial autonomy and strong political base had the power to act. The Mayor also had the incentive to act: the restoration was undertaken as part of a programme to be selected as the party's candidate for President and to be elected as President – he was successful in both.

The relevant question is then: why, given the Mayor's desire to be selected and to be elected, was implementing a river restoration project identified as a productive strategy to these ends?

## **Context**

Korea is a new old country; it is one of the oldest cultures in the world but for most of that history it has had an uneasy existence as, at best, a buffer state between China and Japan and it was occupied by Japan between 1895 and 1945. The Japanese suffered from the same sense of racial superiority as the Nazis, and Korea was treated with the same brutality as characterised the Nazi occupation of Eastern Europe and the same routine level of resource plundering. Independence following the Second World War therefore left it a very undeveloped country with only those facilities which suited the interest of its occupiers. Independence was almost immediately followed by the Korean War when invasion from North Korea at one point reduced South Korea to a pocket around Busan in the extreme south and before the armistice the country was a battlefield. For much of the period following independence, the country was ruled by military governments.

So recent history is a rupture with the past, and institutions are being invented. What is seen in Korea is an acute form of time compression in development; in Korea, the stage in development that in Europe and North America took over 150 years has been compressed into 60 years. In turn, this time compression of development is what the middle and lower income countries are also seeking to achieve but over an even shorter time scale. It is also over those sixty years in which South Korea was transformed in an urbanised society; now 82% of the population lives in urban areas.

As an old culture, Korea has been characterised as being the most traditional and conservative form of Confucianism. Confucianism places a strong emphasis on duty: rulers have a duty to do good whilst there is then a hierarchical sense of duty. As a philosophical system, Confucianism is readily adapted to a hegemonic system because it places such a strong emphasis on achieving social harmony and stability through the duties within a hierarchy. Korea too was free of that mixture of beliefs that characterised the development of China, notably the continuing tension between Confucianism

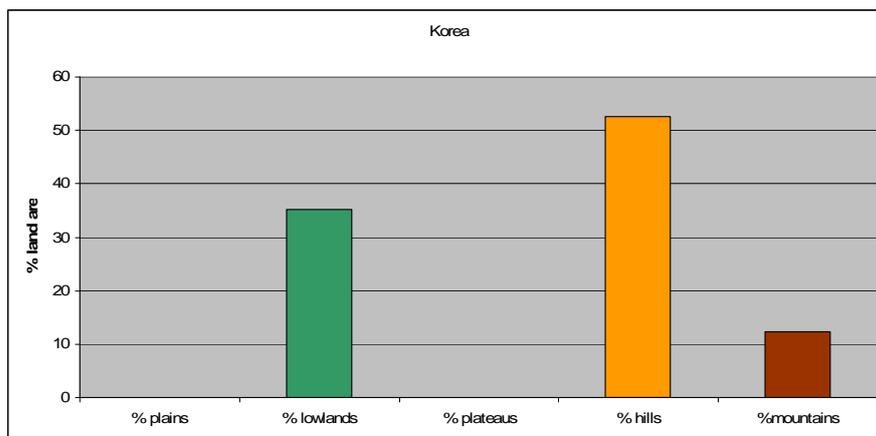
and Daoism. The result was, arguably the form and not the substance of Confucianism taking root in Korea.

The sense of hierarchical duties, without the concomitant duty to do good resulted in, amongst other things, at one point 30% of the population having become hereditary slaves, slavery not being abolished until 1897. In addition, there was in effect a caste system. These limitations on social mobility are said to be the reason why Christianity was able to prosper in Korea after protestant missionaries arrived at the end of the nineteenth century.

This Confucian tradition continues. Thus, one's superiors are right even when they are manifestly wrong: some years ago, a hydrologist working with a Korean colleague was shown a hydrological map which was obviously in error. When he commented, his Korean colleague said that it was drawn by his Professor and hence could not be directly questioned. One of the corollaries is that it is difficult to disentangle what actually took place in a policy process because there is an official truth which few will wish to challenge.

The importance of this Confucian tradition should not be overstated in that student demonstrations, particularly against the military governments, are a continuing feature of Korean culture and these often involve violence on both sides. One of the under-studied aspects of governance in practice is then the differences between countries as to which groups demonstrate with what frequency and how they demonstrate. One of the significant comparators between countries is then which groups do not protest in which countries, although an absence of demonstration may mean either that they lack the capacity to organise in this way, or that they regard their concerns as being adequately taken into account in the decision process, or that a protest would not generate wider support – a march by bankers in support of their bonus payments would be unlikely to have a positive effect and, depending upon the culture, would be likely to provoke anything from abuse to violence.

**Figure 1** South Korea: land form

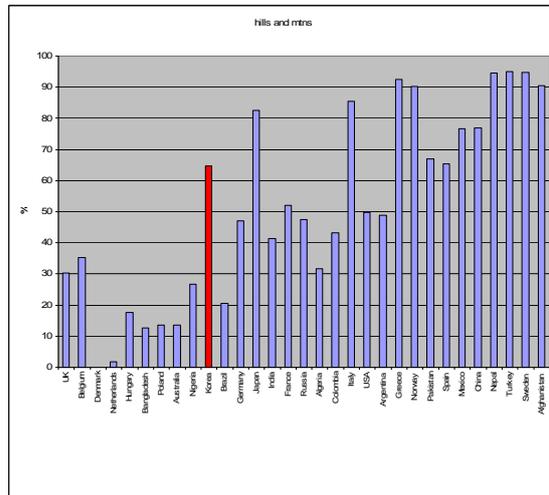


At the same time, Korean culture has been strongly impacted by western culture seen perhaps most obviously in the obsession with western style weddings, something which is globally one of most pervasive cultural

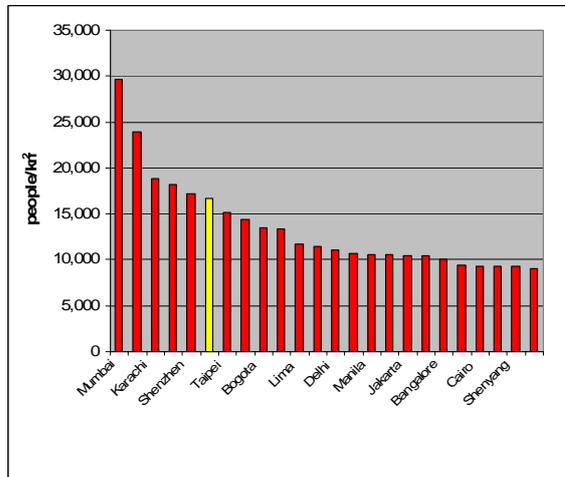
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adoptions. Similarly, a significant number of people have now been partly educated in the USA and UK, academic systems which are institutionally opposed to deference because of the emphasis on developing critical thought. So there is a tension between two cultural models where the western model is associated with modernity.

**Figure 2** land form: comparison between countries



**Figure 3** Comparative urban densities



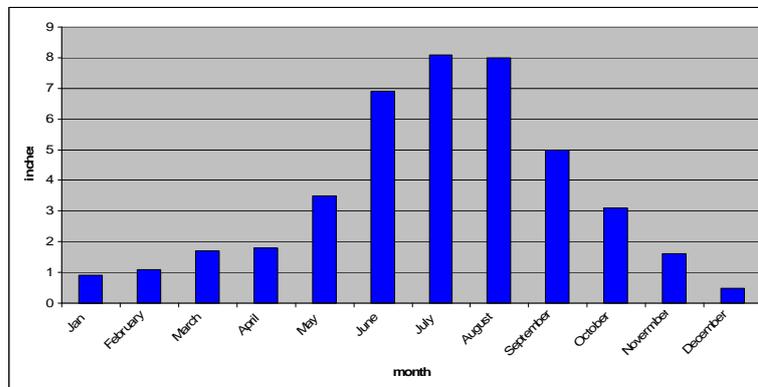
Over 60% of Korea is either hills or mountains and thus of limited use except for forests (**Figure 1**). Whilst not as an extreme proportion as, for example, Japan, this is still a relatively high proportion (**Figure 2**) and hence increases the pressure on other land in what is a very densely populated country (480/km<sup>2</sup>). In turn, Seoul has the ultra-high urban densities that are characteristic of Asian, African and South American cities (**Figure 3**), the average density of the Seoul/Incheon conurbation being 16,700/km<sup>2</sup>. The Seoul-Incheon conurbation is the home to nearly 50% of the population of South Korea. The population density coupled to the relative scarcity of flat

land creates great pressure on urban land and in turn both cities are typified by high rise apartment buildings (**Figure 4**).

**Figure 4** typical urban landscape Seoul<sup>1</sup>



**Figure 5** Korea: rainfall distribution



Seoul lies on the west of a country which has a typical monsoon climate, with a marked rainy season, and the occasional typhoon. As **Figure 5** shows, summer rainfall is high and that is associated with high rainfall intensity; total rainfall is 1370mm a year. Although total rainfall is moderately high, it is accompanied by a high PET. The variation in rainfall over the year means that local rivers are characterised by very marked variations in flow over the year, with the ratios of maximum to minimum flows commonly being in the range of 100-700 to 1. If the river channel is defined as that which has developed to take the flow of the flood which occurs on average every year then for most of the year, that channel will be dry. Of the five major

<sup>1</sup> All photographs by colin green

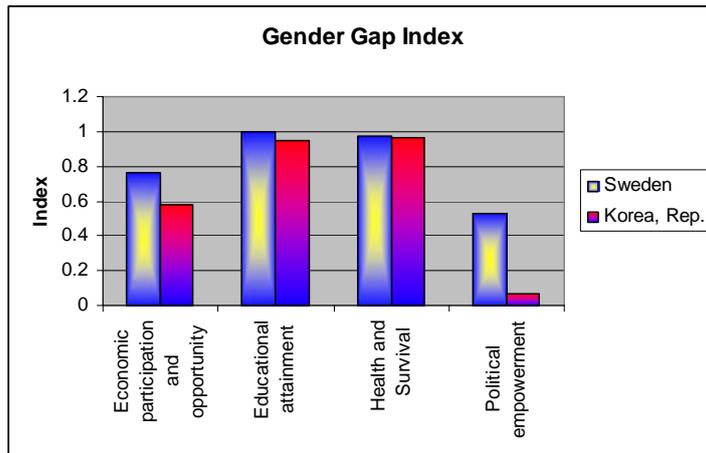
catchments in the country, Seoul lies at the mouth of the largest, the Han river (catchment of approximately 26,000 km<sup>2</sup>).

Whilst water scarcity is cited at a national level as a key problem. Water scarcity is essentially an agricultural issue rather than being a real problem for urban water supply. As almost everywhere it is water for food production which is the problem. For all urban purposes, a water availability of around 80m<sup>3</sup> yr/p would be adequate for all urban uses and this is comfortably exceeded in Korea.

A second consequence of the marked rainy and dry seasons is that it is necessary to capture and store some of the summer rain in order to have water available in the dry season. Whilst paddy rice was the logical technological adaptation to a growing season accompanied by heavy rainfalls and thus waterlogged soils, the high PET also often requires support in the form of irrigation. In a country a large proportion of which is hilly or mountainous, and thus interspersed with valleys, storage reservoirs are the most space efficient way of water storage. Storage is also one of the most effective strategies for flood risk reduction. At the same time, post-independence, dam building was appropriated as a symbol of modernisation and progress, as it was in many countries. By building dams, politicians could demonstrate both their commitment to modernisation and their success in delivering it. But the growth of environmental concern has also been accompanied in Korea as elsewhere with attacks on reservoir construction, and particularly on the physical dam, as symbols of destructive anthropogenic changes to nature (Lowry 2003). Equally, dam construction has become seen as the archetype of the engineer-led approach to water management: resolve any problem by building some thing large such as a dam or an inter-basin transfer system. Hence, the global argument (WCD 2000) as to when, if ever, the construction of large dams is in part argument about the approaches of which dams are both a physical manifestation and a symbolic statement. In Korea, the opposition to the construction of dams may also be linked to opposition to the role of the chaebols, the large family owned conglomerates, in both politics and business. One consequence is that in Korea, dams ceased to be effective as a symbol of modernisation and progress and other symbols had to be sought.

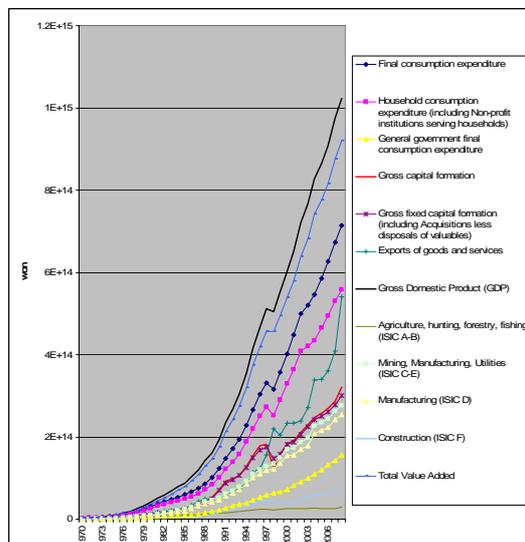
When Seoul and Korea achieved the standards of the Millennium Development Goal is not known; water supply and sanitation coverage in urban areas is now essentially complete. This process was probably aided by the development in the form of high rise apartments which are not a viable form of development without reliable supporting services. However, the water supply in Seoul was deemed to be safe for drinking purposes only in the last few years. Equally, there is an absence of statistics available in English as to consumption levels, problems with flooding, and the degree of wastewater treatment adopted. Similarly, the only indicator of the degree to which the technologies, other than river restoration, associated with sustainable water management have been adopted is the lack of explicit reference in the literature in English to the adoption of SUDS, green roofs and so on.

Figure 6 Gender equality gap



Seoul and South Korea grew explosively after the end of the Korean War; in 1945, the population of Seoul was 900,000. Similarly, GDP per capita was US\$100 in 1963 but is now close to US\$20,000, reaching US\$32,000 in Seoul (but much higher in the industrial centres in the south). That growth in national income has resulted much more money being available for private or public investment, although 15% of national government expenditure is dedicated to defence (from North Korea). The Gini coefficient is 31.6, thus income distribution is much less uneven than in many countries, and the proportion of household income spent upon food has now fallen to 23.1%, typical of the middle to high income countries, so that a large fraction of household income is available for expenditure, taxation or savings. The Human Development Index has risen from 0.713 in 1975 to 0.921 in 2008, which ranks South Korea as 26<sup>th</sup> in the world but it still lags badly on the World Economic Forum’s Gender Gap Index, scoring 0.641, ranking 97<sup>th</sup> in the world in 2007, scoring very poorly on political empowerment. **Figure 6** compares the sub-indices for Korea against those for the country estimated to have the least gender inequality in terms of WEF’s index.

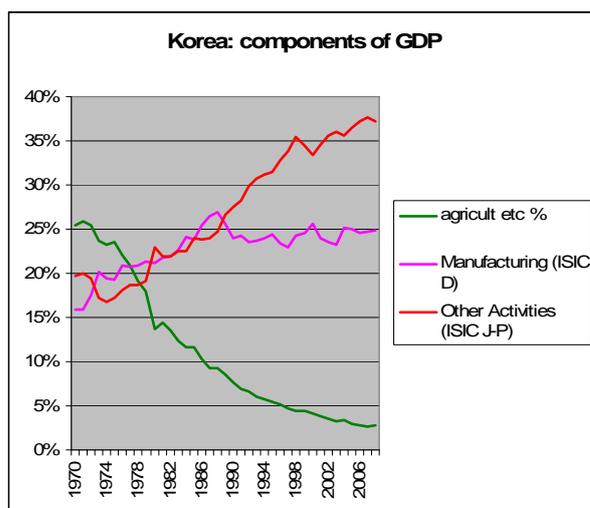
Figure 7 Korea: GDP growth and components



**Figure 7** shows the growth of GDP in South Korea since 1970. At its peak, annual growth in GDP reached 15% per annum, a rate many times greater than the peak rates in the equivalent 'tiger' economies of the nineteenth and early twentieth centuries.

As **Figure 8** shows, that development has been accompanied by the usual structural change in the economy: even in 1970, agriculture and associated activities comprised over 25% of economic activity but by 2008 this had fallen to 3%, with service sector activities rising from 20% to 37%.

**Figure 8** Fall in proportional contribution of agriculture to GDP



Seoul is the financial centre, and a globally important one, of the country, a country which has a policy of moving to a post-modern economy, based upon innovation, so it is highly wired, with the highest global access to broadband, with average broadband speeds now of 14.6 Mps with up to 100 Mps in major areas, the intention by 2012 of achieving 1 Gbps, and 3G mobile coverage. So the focus of the economy is on the new technologies notably robotics and biotechnology. The lack of tourism to Korea is a matter of political contention.

## Government structure

South Korea has a US model governmental structure in that there is a directly elected executive President. Thus, the challenge is to become a party's candidate for President. Like France, the route to becoming the candidate is often through being mayor of a major city and the two largest are Seoul and Incheon. Since 20% of the population, and hence voters, live in Seoul, being a highly visible and successful mayor of Seoul is an obvious means of being accepted as the party's candidate.

Seoul is administered as a 'Special City', the rest of Korea being divided into 9 provinces and then into counties, the larger cities themselves being Metropolitan counties, and ordinary cities (those over 150,000) being counties in their own right. Seoul has an elected executive Mayor, who then appoints three vice mayors, and an elected 104 member Metropolitan Council.

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Probably significantly, the position of Mayor is one which senior politicians will run (currently, former Ministers and a former Prime Minister are said to be thinking about standing in the next Mayoral election), and which has been used as stepping stone to run for the national Presidency.

Seoul has a second tier of local government of 25 wards ('Gu'), and a third tier of 522 neighbourhoods. Since 1995, the wards have had a degree of autonomy and each has an elected Mayor. Responsibilities in key areas are split between the Metropolitan Government: thus the Han river is the responsibility of the Metropolitan Government, small rivers of the Gu; sewer pipes with a diameter greater 900mm are the responsibility of the Metropolitan Government, whilst smaller sewers are under the responsibility of the Gu.

The total budget of the Metropolitan Government is some US\$ 15 billion whilst the Gus have a budget of US\$ 5.3 billion. Of those budgets, US\$ 8.9 billion and US\$ 1.2 billion are raised locally, the balance being transfers from central government, with the Gus being funded in large part by the Metropolitan Government. This high proportion of revenue being raised from local taxation gives the Mayor considerable autonomy.

Seoul Metropolitan Government is composed of 23 bureaus and 65 divisions, and employs 16,121 people directly; the 25 wards employ a further 31,035. The Office of Waterworks has 2895 employees in 11 district waterworks offices and 9 water purification offices; the tariffs are approved by the city council. In addition, there are 7 public corporations covering public transport, wholesale markets, medical care, housing, and facilities management.

Crucially for this project, the Metropolitan Government has responsibility for the construction and maintenance of roads over 20m wide, the Gu have responsibility for lesser roads. However, formally the Metropolitan Government has only responsibility for the Han river with the Gu having responsibility for the small watercourses and branches of the Han river. Thus, the relevant Gu would have had formal responsibility for the Cheonggyecheon and it is not clear how the interaction took place in the decision process. The Metropolitan government has however responsibility for sewers over 900 mm diameter.

What is apparent is that there is a strong emphasis on Open Government as an aspect of modernity, what is less clear is the relative significance of different elements of civic society but the indications are that it is citizen groups rather than environmental NGOs that are most important. This development runs counter to the grain of the tradition of conservative Confucianism, with its stress on hierarchy and deference. But the development of an educated middle-class, particularly of educated middle-class women, was strongly associated with the rise of social activism in the UK in the nineteenth century. There, on the environmental front, such activist movements as the campaign to preserve Hampstead Heath in London from development and the foundation of the National Trust had a strong element of leadership by women. Such campaigns led by women seem to be common in Japan and there are some indications that the same is true in Korea -

Confucius was entirely unsound on the role of women: they didn't have one other than to obey.

## **Policy change**

There are a multiplicity of different models of the process of policy change (Sabatier 2007). Any theory of policy change must be able to explain why policy change did not occur in some context as well as why it occurred when it did occur, and also why one policy change alternative was chosen in the latter case. The validity of a theory of policy change is thus measured by the proportions of false negatives and false positives as well as the proportion of correct positive and negative predictions. For the possibility of a policy change to exist at all, there must exist an alternative to the current procedure and at least one group who argue that this alternative is not only feasible but in some way better than the existing procedure. That argument may be there are some definable problems with the existing procedure, or that some objectives which ought to be societal objectives are not adequately addressed by that procedure, or simply that their own interests are either adversely affected by the existing procedure or their objectives are not addressed. In any event, the arguments whether or not they are driven by self-interest will normally be expressed in terms of societal objectives and concerns, choosing those arguments to build support from other groups and interests. Thus, the rich may argue for tax cuts on the basis of economic arguments about 'trickle down' benefits or in terms of individual liberty. Again, those who oppose the siting of wind farm near to them will normally argue in terms of the ineffectiveness of wind energy, or the preferability of alternative energy sources, or the importance of preserving the landscape. Even very small children soon learn that arguing along the line of 'because I want it' are less effective than a reasoned argument which would lead to the same conclusion. The former is easily rebutted by the response 'but I don't' whereas the latter normally evokes a reasoned reply which may be weaker. In addition, the former approach is not socially approved whilst the latter generally is. One obvious consequence is that the surface arguments for and against a policy change often conceal the underlying arguments for and against a policy change which are more self-centred in focus. A second consequence is thus that the adoption of sustainable water management practices may then result from the pursuit of other arguments or other arguments may be used to justify the adoption of sustainable water management practices.

One popular model of policy change is the 'crisis as a catalyst' concept (Keath and Brown 2008). One difficulty with this model is defining what then constitutes a crisis which ought theoretically to have resulted in a change without adopting the circular approach that if a change occurred it was because of a crisis. Secondly, the question arises is whether it was the crisis which provoked change or whether an apparent crisis provided the opportunity to induce a change. In the latter case, defining an event as a crisis would be a good way of inducing a change. It has been said, for instance, that one should never waste a crisis: that when the media and politicians are asking what went wrong and what can be done, this is the best

time to propose a new solution and radical change – provided that the proposed solution has at least validity on the face of it.

I've argued elsewhere (Green and Penning-Rowsell 2010) that all action is ultimately expressive of social relationships; either what they are or what they ought to be. Thus, actions have symbolic weight and a policy change needs to be viewed in these terms as well as in functional terms. The Korean shift to river restoration may be seen as another example where water management has been annexed to wider political concerns to demonstrate 'modernity' and progress. Swyngedouw (1999) has argued that reservoir construction and irrigation were so used as symbols of Spain's modernisation from the late nineteenth century onwards.

This may be denigrated as 'gesture politics' but there is nothing wrong with gestures, symbols, if they are the right symbols or express positive intentions. Gesture politics gave us the Acropolis, built to symbolise the might and culture of Athens, St Peter's in Rome, and the Potsdamer Platz in the reunified Berlin. Staying with a European perspective, the same desire for symbolic expressions of civic achievement gave us the town halls and town squares which are commonly some of the finest urban spaces and architecture of European towns and cities.

As a symbol, any action is more effective if it is a physical object which is highly visible (and in turn it can be officially 'opened'). Indeed, a symbol does not work at all unless it is widely perceived and interpreted in the intended sense. In turn, the design of what is done may be influenced by the concerns for its effectiveness as a symbol as much as its functional effectiveness. Visibility includes visible change and one strategy that can be used is to make visible that which is normally invisible: for example, by setting targets and publicising the annual results. Thus, the last UK government set up a series of performance measures for different aspects of the health and education system and the latest Five Year Plan in China sets targets for increasing water efficiency in industry. Visibility obviously works best when change can occur quickly.

The great advantage of river restoration is therefore that it is highly visible and can be achieved quickly. Conversely, setting a target to reduce water consumption or to introduce SUDS would necessarily take a considerable period of time to implement. For comparison, Singapore has concentrated upon recycling potable water, achievable both quickly and visibly, and rather less on demand management; household water consumption is rather high at 160 l/p/d (Lee 2005). Singapore's programme may however have a secondary impact upon water consumption by highlighting the scarcity of water in Singapore: the symbolic may induce the functional.

The difference between gestures is between those which are intended only to appear to adopt action and those which signal a wider commitment to that course of action. The difference is apparent in terms of the wider context of action and thus whether the big gesture is simply a token or the flag leading a broader coherent set of actions. In the case of the Cheonggyecheon, the

appropriate interpretation would seem to be that it is one of most visible gestures of a coherent set of policies promoting sustainable development. Jackson (2009) reports on a HSBC analysis of the different national and EU stimulus programmes to encourage recovery from the banking crisis induced recession. Of the programmes analysed, Jackson considers the 2009-2012 programme of South Korea is the greenist of the programmes. Of the planned investment of US\$30.7 billion, some 80.5% is categorised as promoting different aspects of sustainable development:

- conservation (low carbon vehicles, clean energy and recycling)
- quality of life (green neighbourhoods and housing)
- environmental protection (incl flood defence)
- infrastructure (IT and green transport infrastructure)

For comparison, the next highest proportion is 58.7% for the EU package, the various national programmes all devoting a considerably smaller fraction towards sustainable development.

Restoring the river Cheonggyecheon in the centre of Seoul, the head of the river reaches to the Han river, was a highly dramatic gesture and one that was effectively publicised not only in Seoul, and in Korea, but globally. Thus, there are probably no other river restoration projects which are associated with a museum (to be seen in the background of **Figure 12**).

Both Tucci (2007) and Brown et al (2008) have suggested that there is a progression in the development of urban water management services. Thus, Tucci (2007) argues that there are three stages:

- Pre-1970 – public health
- 1970-1990 – corrective
- 1990 onwards - sustainable

Brown et al (2008) argue for rather more stages but in each case the question, beyond whether such a progression can generally be observed in different cities and over different periods of time, is whether such a stage model is only historically descriptive, and, if so, of what, or whether it has some causal explanatory power which could be applied to any city now or in the future. If it is causal, it could simply reflect the development of knowledge and technology: it was not until the late nineteenth century that the germ theory of disease was developed and hence the relationship water and disease was understood. Only later were the technologies for secondary and tertiary wastewater developed (Cooper 2001) but there an argument could be made that the technologies only developed then in response to the developing desire to deal with those pollutants. To be more than historically interesting, such a model, however many stages it has, has to claim to explain how the concerns of a society change as it becomes richer. It has to claim to be the equivalent of the now discredited argument for an environmental Kuznetz curve (Stern 2003) – which argued that pollution first increases with development and then is reduced as, with further increases in income, pressure occurs to reduce pollution. Thus, that there is almost an inevitability that a city will develop through the different stages. However, that water supplies in Seoul were deemed to be safe to drink simultaneously with the undertaking of

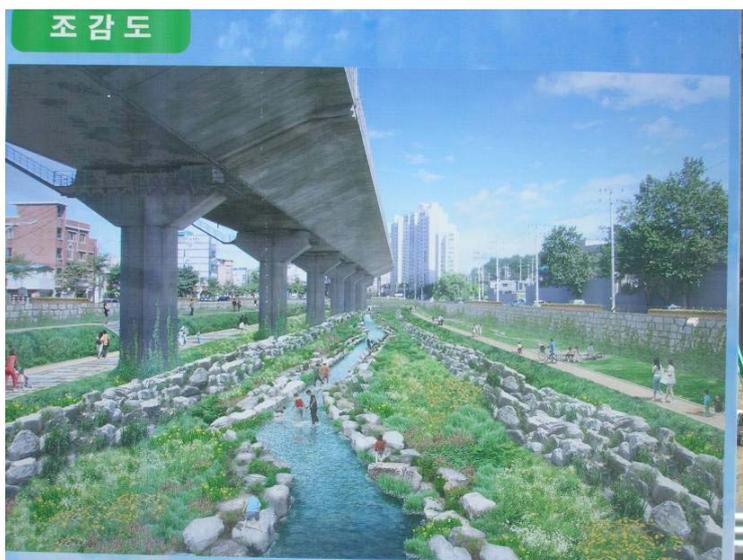
Cheonggyecheon river restoration project suggests that there is no inevitability about the sequence.

## River restoration

The Cheonggyecheon is the most expensive river restoration project yet undertaken in the world. Several figures are cited but the cost was around US\$366 million. It is a project which has now become national policy with national implementation with many projects scheduled across the country. It is a 'flagship' project, and the river restoration project has its own substantial museum. Within Seoul, a further 328 billion won<sup>2</sup> has been allocated to restoring a further 17 rivers. Similar projects are being undertaken in the neighbouring city of Incheon. The national "Four Rivers Restoration Project", which has other aims in addition to river restoration, has an expected budget of US\$ 19 billion. By 2011, 301 kms of projects will be completed at a cost of 1,180 billion won. Given that demonstration river restoration works began in 1998, this is a very rapid transition.

The Cheonggyecheon restoration involved the removal of an elevated highway built over the course of the river which itself had been covered over both to remove a highly polluted river from sight and to provide a major traffic artery. The removal of the elevated highway, built in 1976, was less problematic than it might have been because it was in a structurally poor condition and if not removed would have required extensive renovation. But the project was strongly opposed by local merchants and retailers; without detailed project maps it is not possible to be certain but it looks probable that constructing the roads on either side of the river to replace the old road over the river required land acquisition and the relocation of businesses and people.

Figure 9 another river corridor



<sup>2</sup> The current exchange rate is €1 = 1537 won

The river characterises the cycle of transformation of urban rivers; in the 1940s, it was a gutter carrying away human and other wastes. To remove the sight and smell of this pollution, it was converted into a series of sewers in 1959. This process was typical of many cities as the old watercourses were the natural drainage channels and hence ideal locations for gravity operated sewers. Again, typically, the expansion of traffic required new roads and converting the watercourses to sewers simultaneously freed up space to insert new roads into the existing urban infrastructure without demolishing large numbers of existing properties. Subsequently, as with other river corridors in Seoul (**Figure 9**), the elevated highway was built over the road that had been built over the culverted river.

Had the highway been in good condition, the argument for demolishing a perfectly good main highway would have been more difficult to make. As it was, given that the highway had effectively to be demolished, it was easier to go the further step of deciding to restore the river. That itself was expensive because the surface road had to be replaced by roads on either embankment, and the all the associated utilities, specifically the sewers which then used the old river channel, had to be reconstructed.

A second possible reason why the decision might have been easier than it otherwise would have been is the use of the restored river as a major flood relief channel. The restored river is designed to cope with the 1:200 flood flow and sewers surcharge to the river in the event of an extreme rainfall event. This suggests that the alternative to the open channel of a restored river would, in the short term, have had to be either a series of underground flood storage areas or some extremely large tunnelled sewers. Both would have been extremely expensive. But no information in English has been uncovered as to the extent of flooding in Seoul or indeed the design standard of the existing sewer system although that will inevitably be less than a 1 in 200 year standard, particularly in light of the very marked variation in flows in rivers over the year.

Thus, it may be the case that the restoration was a way of turning into a positive what otherwise would have been a negative; the expenditure of a very large sum of money to replace a poorly constructed highway and resolving an urban flooding problem.

There are arguments as to whether the transformation of the Cheonggycheon constitutes 'river restoration', or indeed, whether it is correct to term any form of greening of a river to any condition other than that which would exist in the absence of human land occupation as 'restoration'. In the latter strict sense, restoration would be impossible: the urbanisation of the Seoul area has completely changed the drainage pattern of the catchment. As with any urbanisation, infiltration to the soil, and hence the draining of groundwater to watercourses, has been eliminated. The second effect of impermeability has been to both greatly increase runoff during rainfall and to reduce the time of concentration of that runoff: there is more water, more quickly. Thus, in these conditions, the Cheonggycheon would now be characterised by a dry bed for much of the year and a large flood channel

during the flood season. Since ecosystems depend upon the flow regime, the ecosystem that would have developed in the absence of the artificial sweetening flow would in any case not have been the same as that which existed in earlier periods of the settlement of Seoul. Even in August, the second wettest month, the flows in other similar rivers in Seoul were seen to be minimal.

**Figure 10** Sewer overflow



So the first 'distortion' from the natural conditions is that water now has to be pumped from the river Han in order to provide a flow for the river Cheonggycheon. This flow level looks to be artificially high and the flow regime is almost certainly more uniform than would exist under 'natural' conditions. Secondly, the river remains part of the natural drainage system of Seoul, although most of that drainage system is now provided by sewers. Those sewers surcharge to river Cheonggycheon in heavy rainfall conditions (**Figure 10**). In turn, the channel is designed to convey the 1 in 200 year rainfall event and loudspeakers broadcast announcements to evacuate the channel when rain is forecast (**Figure 11**).

**Figure 11** head of the river



The form of the river changes over its length as it stretches from the central area of Seoul to the Han river where it is part of the urban theatre (**Figure 11**), it is progressively more 'natural' in form (**Figure 12**).

**Figure 12**      **downstream section**



Much greater public engagement with the water is encouraged than would be usual in Europe where concerns about the risk of accidents or pollution dominate. That this engagement is promoted is shown in the concept drawings for another current river restoration project (**Figure 9**), the detailed design of the Cheonggyecheon scheme (**Figure 13**), and observed in reality as people paddle in the river. The upper reaches of the river are intensely used by pedestrians whilst only occasional visitors are to be seen downstream. Where bridge columns cross the river, the columns are festooned with offerings of padlocks: the meaning of this custom is not clear to me although it can be guessed.

**Figure 13**      **detailed design**



In ecological terms, only a superficial impression can be given; fish and insects are present, along with water birds (see cover) and plants are flourishing. Generally, the detailed design features are successful although isolated examples of erosion can be seen. Surcharges during rainfall must produce pollution pulses along the river but in the wet month of August, sewer

debris was not observable and the river has a multiplicity of features to induce aeration of the water column

### ***Limitations of this analysis***

Analyses of decision processes ideally require the skills and approaches of anthropologists, starting with the ability to speak the language, and including a long period of fieldwork, living with the participants. The object is then to understand the world as seen and constructed by the culture which is being explored. At the same time, the outsider, the anthropologist, has the possibility of detecting those things which specific to the culture in question, which are simply not noticed by those immersed in the local culture, because the anthropologist has at least one alternative culture against which to compare the culture in question. Such an anthropological approach was not possible in this instance and the author is aware as to exactly how much is unknown. In part, many Asian cultures have decision processes which are quite different to those common in European and North American societies. For example, those cultures where saying 'no' is considered to be very rude so that there are a multiplicity of ways of saying 'yes' that mean 'no' – and where more particularly, it is desirable to avoid reaching a situation where it is necessary to say 'no'. In these contexts, it is easy for the foreigner to mistake form for substance. For example, to assume a system is highly centralised when in actuality the role of the top level body is to formally announce the agreement that has been reached through the lower level bodies. Only when agreement has proved impossible at lower levels does the top level body have to determine what will be done. Thus, disagreement will be seen as a sign of failure. Anglo-Saxon societies conversely are structured to promote disagreement as a way of testing the alternatives.

How stakeholder engagement actually works in a culture which amongst other things has an emphasis on harmony is thus an interesting question as is the question of whether such a society will be better at achieving stakeholder engagement than an Anglo-Saxon adversarial model. What is argued here is that it is more difficult to observe the process and especially to look back on the process than to observe the process in an Anglo-Saxon society. In the latter, the debate will be both more open and clearcut. In turn, I was unable to gain access to the participants in the decision process – in this instance, the key player is now the President of South Korea - and this report is only informed by academic colleagues.

### ***Transferable lessons***

As a case study, this is a simple one: there was a single person with enough power to effect change. Hence, the interest of the case study is not in 'how' but in 'why'; why did the Mayor choose river restoration?

There are both positive and negative lessons from this project. On the negative side, this was still a classic big, engineering led project and it has

engendered a series of other big engineering projects. It thus differs in both scale and process from the local, piecemeal and fragmented but stakeholder based experience of river restoration in Europe and North America. In turn, it has been followed by even larger big engineering projects, varying from the river side parks being constructed in Seoul, to the Four Major River Restoration Project. The latter is argued by some to constitute a recipe for a potential disaster for both water resources and the environment of Korea. The Four Major River Restoration Project is also reported to be characterised by a lack of public engagement.

Conversely, there is always a tension between the idea of adopting an integrated approach across a catchment and local stakeholder engagement. The Water Framework Directive embodies precisely such a tension when it seeks simultaneously to have fixed standards and to have local engagement, an inherent contradiction. In the case of the Cheonggycheon, it would not have been possible to open up part of the channel whilst leaving the road in others and this would add to the problems with engaging with the local communities. As already noted, in some areas, local traders were strongly opposed to the river restoration programme. Whilst some public engagement is reported, it may well have been manipulated by the Mayor to drive the project through. Such attempts to manage public engagement led to clashes in a subsequent river restoration project in the neighbouring city of Incheon when the city administration sought to take executive control of what was said to be a joint committee.

On the positive side, it demonstrates the effectiveness of using some aspects of water management as symbolic projects. Unfortunately, few aspects of sustainable water management can be used so effectively to achieve quick results. The concept of progress and modernism, now in the form of sustainable development, continues to be an effective means of promoting particular intervention strategies. Secondly, it is another example of the crisis as opportunity model: if the elevated highway had not needed major refurbishment, then it is much less likely that this project would have been undertaken. There is also a suspicion that a further major advantage was that it enabled flood alleviation from surface water flooding to be introduced at a much lower cost than would otherwise have been incurred. Thus the transferable message here is to look for a positive opportunity for change.

What makes an effective successful political symbol? A number of characteristics would seem to be required:

- It can be implemented relatively quickly, generally within one political cycle (i.e. the Olympics are an exception but the political benefits are arguably in the run up).
- It is highly visible.
- It is successful and widely regarded as successful.
- It is demonstrative of the politician's wider political philosophy.
- It is expensive: cheap implies a lack of conviction and expensive demonstrates an ability to mobilise a large quantity of resources for the benefit of the politician's voters.

- It is different: it has to mark out the politician as offering something different both from their predecessors and their competitors.

Several of these reasons suggest why the traditional big engineering solutions have been so popular in the past. Hence a problem in shifting to sustainable urban water management is that the technologies involved do not perform well against all of these criteria. Notably, their adoption is slow and they lack visibility; for example, often when looking at building employing rainwater harvesting there is nothing to photograph.

An issue therefore is how to increase the desirability of the use of these technologies from the politicians' perspectives. One strategy that has been adopted elsewhere is to increase the visibility of SUDS: the use of 'rain gardens' (Dunnett and Clayden 2007). Similarly, the adoption of retention basins as a form of SUDS has the advantage of being highly visible, attractive and creates public space. They can be formally opened with the associated media attention.

The drawback of all sustainable urban water management approaches is that they take time to implement and are individually all small in scale. What is needed therefore is alternative way of generating publicity. One strategy is the creation of an awards system: for example, an annual award for delivery of sustainable water management for different categories of building. A second is the introduction of an annual or biennial conference; the Mayor of Incheon has adopted this strategy. What is desired is a system which generates a round of publicity on at least an annual cycle.

The disadvantage of sustainable development as a concept and approach in the long run is that it reduces the scope for a politician to be different from their predecessors. Once a path of sustainable development is achieved, the problem will be to stay on that path rather than brave, new initiatives.

The limitation on the transferability of the case is dependence upon a strong local power basis: a high degree of local autonomy in terms of revenue and the use by politicians of the position of executive Mayor as a route to becoming President.

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