Adaptation Options and Cost in Water Supply

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1.0 Introduction

One of the impacts of climate change will be an acceleration of the hydrologic cycle, which will increase the amount and variance of annual rainfall in most nations of the world (Intergovernmental Panel on Climate Change, 2007). Another driving factor influencing availabilities of water supplies is demographics, urbanization, globalization and economic changes. All of these combined will result in increased stresses on the water resources of most nations.

Water resources for direct anthropogenic purposes are for either instream uses such as navigation and waste assimilation or offstream or withdrawal uses such as domestic water supply and irrigation. Water can be withdrawn from both surface and ground water sources but since in most cases these are hydraulically connected, withdrawal from one source impacts the other source. The process of offstream use is as follows: development or production of raw water from wells, reservoirs, and directly from rivers; transmission or conveyance; treatment; and distribution to users. Wastewater should then be collected, treated and properly disposed of. A third category of water supply is starting to receive more attention; "green water". This is water that is evapotranspirated from infiltrated precipitation and that produces 60 to 70 percent of global food production (Falkenmark and Rockstrom, 2004). The objective of this report is estimate the influences of climate and socio-economic changes by 2030 on the water supply production facilities of individual nations assuming reasonable measures are taken by them to respond to or adapt to these driving forces. The costs of the adaptation measures are also calculated. Production facilities include reservoir storage, wells, reclaimed municipal and industrial wastewater, and desalination. The analysis was done for two climate change scenarios; one favoring greenhouse gas (GHG) mitigation and the other favoring continued growth in emissions. The report includes methodologies and key assumptions, cost results, financing implications and conclusions.

2.0 Methodologies

There are many possible adaptation responses to the impacts of climate change on water supply. Supply side examples include increasing reservoir storage and ground water pumping, conjunctive surface/groundwater use, rainwater harvesting, water banking, desalination and water reuse, and better use of weather and seasonal forecasting to improve reservoir management. Some demand side options are improved irrigation and rainfed agricultural practices, increased industrial water efficiency, leakage management, increased use of recycling and water reuse, use of virtual water, water markets, more climate awareness, and drought management plans. Integrated water resources management includes both supply and demand sides. Here only increased reservoir storage and ground water use, water reclamation, desalination, and virtual water are considered. The demand projections, however, did include increased efficiencies over time compared to the present.

The analysis was done by nations organized by the following regions: West Africa; Central, Southern, Eastern, and Northern Africa; Asia; South America; the Caribbean; North America/Europe; and the rest of the world. The analysis period is 2030, but since water resource investments are typically made at least for 20 years in the future, the planning period is 2050. This assumes that nations are willing to plan ahead for climate change. Therefore national water supply and demand estimates were obtained for 2050 under two climate change and associated socio-economic scenarios, SRES B1 and SRES A1b.These were selected because B1 is considered a mitigation scenario and the other is considered a GHG growth scenario. A1b in particular was chosen because consistent data for both national water demands and water availabilities were available from one source. Changes in supply requirements compared to 2000 conditions were estimated for each climate change scenario.

Water Demands. The 2000 demands for improved surface water, improved ground water, unimproved surface water and unimproved ground water were estimated for each nation by assuming that urban domestic and commercial uses required improved or treated water sources and that irrigation, rural domestic, and industrial demands required unimproved or minimally treated water supplies. Demands were allocated to ground water sources by equally proportioning demands among the reported total ground water use in a nation from World Resources Institute (2007). If the 2000 use of ground water was not available, then the ratio of surface water internally available in a nation to the total water internally available in the nation was used to estimate the ratio of surface water demand to total demand and hence the estimated ratio of groundwater demand to total demand. In a few cases, the ratio of ground water use to total use was based upon a nearby country where data were considered more representative. 2000 demands for domestic/commercial, industrial (including energy cooling), and irrigation came from United Nations Food ands Agricultural Organization (FAO, 2007).

The next step was to estimate the demands from the same sources in 2050 under the two climate change scenarios given the scenario projections for domestic and commercial, industrial and irrigation demands. The scenario projections were from Shen et al (in review A) for domestic, commercial, and industrial demands. Since the estimates of Shen et al (In Review A) for present demands did not always equal present demands from FAO (2007), all future demands were scaled by the ratios of the two different present demand estimates. In a few cases, the 2050 demands from a sector from Shen et al (in review A) were less than present demands. In these cases, the 2050 demands were set equal to the 2000 demands.

Having derived linear correlations between industrial water use and electricity consumption, Shen et al (in review A) assumed present industrial demands would increase linearly with the national electricity consumptions for the SRES B1 and A1B scenarios. This estimate was then adjusted to account for increases in water use efficiency by scaling it by the ratio of future energy intensity (energy use per GDP) to present energy intensity.

Domestic and commercial demand was estimated by using a relationship between water use per capita and GDP per capita.

Percentage increases in 2050 irrigation demands compared to present were taken from Fischer et al (2006).To estimate future demands, they used their new A2r scenario for socio-economic conditions and the SRES A2 scenario for unmitigated climate change and SRES B1 for mitigated climate change. They used two Generalized Circulation Models, HADCM3 and CSIRO. The demands determined by each model were then averaged for this analysis.

Fischer et al (2006) report global irrigation efficiencies of about 50 percent with a range from 35 to 67 percent. This is water lost to leakage and evaporation losses. Since this was derived as the global and regional ratios of actual crop needs divided by actual withdrawals, this estimate includes any use of irrigation return flows by downstream uses.

Fischer et al (2006) assumed 10 percent increases (i.e. added 10 percent to efficiencies) in irrigation efficiencies from 2000 to 2030 and from 2030 to 2080. In this analysis, an irrigation efficiency increase by 2050 of 15 percent was used. Crop requirements as a function of climate as well as crop requirements satisfied by precipitation were determined and impacts of C02 fertilization were considered. The same amount of irrigated land was assumed under both climate change scenarios. The factors are in Table 2.1.

All the present and future demands are in the tables in Section 4.0.

Water Supplies. It was assumed that the present amounts of reclaimed water, and desalination were negligible and thus that 2000 demands would be met by surface storage and ground water. It was assumed that wells existed to meet the ground water demands. Estimates of present reservoir capacity were derived from a global relationship between reservoir storage requirement and annual surface water availability, its variance, reliability and demand from McMahon et al (2007). The analysis in theory should consider the influences of monthly flow variation as it was derived using monthly streamflow data from most regions of the world. The demand for water from reservoirs was estimated to be the water consumed by the surface water demands; assuming un-used withdrawn surface water is discharged to surface water and available to downstream users, then the actual demand is for the consumed water. It was assumed that 20 percent of improved water and 50 percent of unimproved water are consumed in 2000. There are cases, however, when nations are over abstracting the available surface water (defined below). In these cases, demands for reservoir water were set equal to the available surface water.

Since an estimate of 2000 surface storage was needed, the available surface water in 2000 was defined equal to the amount of surface water a nation was actually using in 2000 minus consumed ground water; it was assumed that ground water consumption depletes surface water. In some cases, surface water was being unsustainably over extracted and actually exceeds the amount of surface water available to the nation from both internally generated runoff and flows from upstream and/or minus flows released downstream. In this case, then the available water was set equal to this actual total amount of surface water available to a nation minus consumed ground water.

It was not possible to find a publicly available, complete database listing storage dams used for water supply and not including other purposes such as hydropower. A comparison of the total storage volumes estimated by this methodology with those for some African nations from FAO (2007) found that, as expected, estimates here were always less than the FAO (2007) values.

Present amounts of internal water resources by nations (hereafter referred to a mean annual flow, MAF) were taken from FAO (2007) for the most recent period, generally 2000. Shen et al (in review B) gave estimates of the variances of 2000 MAF. All variances of Shen et al (in review B) were scaled to reflect differences between their estimates of MAF and the present values from FAO (2007) or the adjusted water available in a nation based upon estimates of upstream inflows and downstream releases.

The allocation of water between nations required judgment. For example, in most cases water was allocated from the upstream nations to downstream nation in a manner that would not cause a water shortage upstream. See the **Results** sections for more details.

The next step was to determine the amount of reservoir storage, wells, reclaimed wastewater and desalination to provide the water to meet each of the 2050 SRES demand and runoff scenarios. Estimates of internal available water for 2050 under the SRES B1 and A1B scenarios were taken from Shen et al (in review B). They also gave estimates of the variances of the scenario 2050 MAFs. In this analysis, averages were used from the six GCMs used by them. As shown in the tables in Section 4.0, in most cases, the mean and the standard deviation (the square root of the variance) increased under climate change and more in the A1B case than B1.

Since values of Shen et al (in review B) of 2000 internal water resources did not always equal present values from FAO (2007), all the 2050 MAFs and variances were scaled. Adjustments were also made in the variances based upon estimates of upstream inflows and downstream releases and the amount of water actually available to a nation after meeting instream needs and groundwater consumption. This is discussed below.

While many watersheds are presently over abstracted for anthropogenic uses, it was assumed that by 2030, there will be an international requirement that instream flows must be at least 60 percent of mean annual internal flows. As reported by Smakhtin et al (2004), environmentally "safe basins" are those where less than 30 percent of the MAF is withdrawn. Fischer et al (2006, page 5) reports that "conditions of water scarcity ….can be regarded as critical when water withdrawals exceed 40 percent …of a region's renewable (internal) water resources ".

If there was sufficient water to meet the total withdrawal demands, then the amount of reservoir storage needed to meet surface water demands was determined. As for the 2000 estimates, this was calculated from McMahon et al (2007). The annual surface water discharge in a nation before any surface water use equaled 40 percent of the MAF minus the consumption of groundwater used, which was estimated as 50 percent of annual ground water usage. The demand for surface water was estimated to be the surface water consumed by demands. It was assumed that 20 percent of improved water is consumed in 2050, and 60 percent of unimproved water is consumed in 2050 due to increased efficiencies in irrigation and industrial water use.

Well demands were assumed equal to the amount of water actually withdrawn from ground water.

If there was not sufficient excess water, then the maximum amount of surface and ground water that could be renewably withdrawn in a nation was determined. This water as then allocated to meet, in order of priority, domestic, commercial, industrial and irrigation needs. Reclaimed water was used to meet irrigation needs if necessary. If water was particularly scarce and a nation bordered an ocean or sea, then desalination was used to meet domestic and commercial needs. In most cases, it was assumed that only 50 percent of such wastewater could be reclaimed. In the few cases of severe water shortage, it was assumed more wastewater was reclaimed. If irrigation demands were not fully meet, then the amount of irrigation demand not satisfied was determined and the amount that was irrigated was considered to have to be "improved" with special water conserving practices to increase yields with the available irrigation water. Unmet irrigation demands were considered to be virtual water requirements. Finally, the associated increases in reservoir storage and wells were determined was previously described.

Milly et al (2005) for the SRES A1B scenario shows generally increasing runoff in inland West Africa and decreasing in coastal regions. Here, runoff generally increases slightly throughout all of West Africa and increases in variance. Both show decreases in southern Africa and increases in the Horn of Africa. They also generally show the same changes in Northern and Central Africa. They both show increases in southern Asia, increases in China, and decreases in central Asia. Milly also shows a general increase in the wetter areas of Australia as is shown here for the entire nation, and a slight decrease in New Zealand, unlike the slight increase here. Both agree upon general decreases in central Europe and increase in Russia and northern Europe. Both also show increases in runoff in northwestern and southeastern South America. They both show Central America becoming drier and Canada increasing in runoff. Here we predict a very small decrease in USA runoff while Milly et al (2005) show an increase in the eastern USA and a decrease in the western USA. Both show a decrease in the Middle East.

A good overall global comparison of demand and supply data from Shen et al (in review A,B) is in Table 4 of Shen et al (in review B). It is a comparison of the world stressed water population under various SRES scenarios where less than 1000m3/person/year of total water availability is defined as stressed. It is generally seen that the values of Shen et al (in review B) are mid range compared to previous research of Arnell (2004) and Alcamo (2006) in all the climate change scenarios.

3.0 Costs

The capital costs (all 2000 USA dollars) of providing the incremental amounts of production facilities were estimated. US **groundwater** capital costs were taken from Kirshen et al (2005)and are, assuming an average depth of ~ 20m, \$100,000 for 1000 m3/day, or \$2.74 x 10^8 per km3/year.

Total costs for **surface water storage** were taken from Kirshen et al (2005) for China, which over all terrains was estimated to be approximately \$300,000/MCM of storage. Based upon the Engineering News-Record index, Chinese costs were estimated to be 70 percent of US costs; thus the USA cost is \$450,000/MCM or \$450,000,000 /km3. Since this is for dead storage, the active storage estimates determined above were increased by 10 percent.

Costs for **desalination** were taken from US Bureau of Reclamation (2002) for a planning study in California USA. The reported capital cost of Reverse Osmosis (RO) technology was approximately \$ 600/m3/day. This compares well with the reported cost of the Ashkelon Desalination Plant in Israel of \$780/m3/day (Water-Technology Net, 2007). \$600/m3/day is equivalent to \$1.64 x 10^9/km3/day.

It is assumed that all municipal and industrial wastewater has the equivalent of secondary wastewater treatment by 2030. In order to use treated secondary wastewater effluent for food crops in California USA, secondary effluent must also be coagulated, filtered and disinfected (Metcalf &Eddy, 2007) to be **reclaimed.** The incremental capital cost of a small facility for this in CA is estimated to be \$904 million/km3/year (Richard, 1998).

Costs were scaled for various global regions using cost indices given in Fischer et al (2006) for regional irrigation costs. Regional costs are in Table 3.1.

4.0 Results

The results are presented in this section. While they are by nation and to several decimal places, they should only be used as a guide to estimate future water production requirements and costs. Use of MAF and associated variances ignore changes in within year temporal variation and influences of changes in snow melt upon water storage requirements. While the use of nations as units of analysis has advantages for demand and cost analysis, it has drawbacks for water supply analysis. The spatial extent of all large nations masks important regional hydrologic differences (such as east and west China, north and south China). In addition, this unit assumes water can be transferred to the users in a reasonable manner. These assumptions result in situations where, for example, in the United States and other countries no additional storage is needed to adjust to one or both of the scenarios; present storage is adequate if the withdrawal rate is just increased. Given the lost of snowpack in the western United States, this finding requires more analysis. Adjustments are also required in water transfers between nations. Other uncertainties, of course, enter the analysis by the use of water demand estimates based upon SRES scenarios and internal water estimates from SRES scenarios and GCMs even if the results are scaled. Missing data also added to uncertainty. Since the average discharge and variances of the six GCMs of Shen et al (in review B) were used, the actual range of changes in mean annual flow and variance might be masked. The analysis also only includes capital costs; operation and maintenance costs are not included. Wastewater management costs are also not included. Therefore all the assumptions result in the cost estimates being less than actually required by an unknown amount. Some of the national cost estimates of large countries with extremely different flow conditions within the country such as China, India, United States, Australia, Russia, and Brazil could be improved if they were subdivided into two or more major sub-basins. Some improvements could also be made if the results could be calibrated with some national estimates prepared by others.

Tables. Results by nation by region are in Tables 4.1 (2000 MAF, 2000 standard deviation, 2050 MAF and standard deviations for SRES B1 and SRES A1b), Tables 4.2 (total 2000 withdrawal demands, 2050 SRES B1 and A1b withdrawals), Tables 4.3 (SRES B1 incremental reservoir storage, wells, reclaimed water, desalination, total improved irrigation needed, unmet irrigation demands orvirtual water demands, total capital costs), and Tables 4.4 (same as Tables 4.3.except SRES A1b).

Because of various missing data values, it was not possible to do full cost analysis for each nation within a region. Tables 4.5 contain derived cost estimates for the nations missing data. It was found that a reasonable method to estimate costs was the adaptation cost per present population for surrounding nations. This introduced extra uncertainties in the analysis because using costs of another nation masked differences in hydrology, location in watershed, and socio-economic conditions. In most cases, however, this methodology only had to be applied to smaller nations with small costs. Thus, while the costs are important to them, the addition costs make little change in aggregate regional cost estimates. Appendix A contains some notes about water allocations made in the analysis.

Sensitivity Analysis. In order to better understand the implications of the results, some sensitivity analysis was conducted on several of the major assumptions.

1. Priority of Water Uses. The model used in the analysis assumes that all nations have water use priorities in following order; Domestic/Commercial, Industrial, and Irrigation. Some nations, however, may have different priorities for water use. In nations where there are water shortages (shown as unmet irrigation in Tables 4.3 in the May 31, 2007 water report), what are implications if priorities were different ?

There are about 26 nations where irrigation shortages occur under scenario A1b or B1. In any nation if the irrigation demands were met first, then the shortages in the other sectors (i.e. domestic/commercial, and industrial) would be larger than the irrigation shortage because irrigation water uses can not be reused whereas domestic/commercial and industrial water uses can be reused. The impact on the re-allocation of water to irrigation in a water short area would be less cost than in the present allocation, but larger shortages in human and industrial needs. It is more difficult to replace the human needs and products of these sectors than it is to replace crops that can not be produced because of water shortages. Therefore, it full accounting was done of the costs of the shortages, the total costs of irrigation shortages would be less than domestic/commercial, and industrial shortages.

An extreme example is Egypt. Its 2050 B1 demand for domestic/commercial (DC) is ~ 15 km3/year, for industrial (IN)~ 50 km3/year, for irrigation (IRR) ~ 130 km3/year. Because shortages are so acute there, in the present allocation scheme, it desalinates for 50 percent of industrial, commercial, urban water, uses its surface and ground waters to meet rest of DC and IN demands and reclaims all DC and IN water for irrigation. Thus there is a shortage of ~ 60 km3/year of irrigation water. If all water allocated to irrigation first, then ~ 40 km3/year of irrigation could be met with its surface and ground waters and only 30 km/year of the 65 km3/year of DC and IN demands (assuming the maximum feasible to desalinate is 30 km3/year because of population and industrial locations). If all of the desalinated water can be re-used after DC and IN use, then a total of 70 km3/year of irrigation could be met for a total IRR shortage of 60 km3/year. Thus while the nation would save money as reusing ~ 35 km3/year less than previously, the water shortages would be worst in the DC and IN sectors, and the same in IRR. The impacts are actually more severe than this in Egypt because here it is assumed all DC and IN water can be re-used; in most cases because of water consumption, losses and other reasons, ~ 50 percent re-use rate is more realistic.

2. Availability of Desalination. Desalination is only used in the model in coastal nations where a large population is located close to the coast and surface and ground water resources are not adequate to meet DC and IN needs. Here, while desalination is an expensive option, it seems to be justified. This is certainly the case today in some water short regions of the USA and the Middle East. Again considering the example of Egypt, if desalination was not an option, its available surface and ground water resources would not allow meeting of its full DC and IN demands. This in turn would further lessen the amount of water for IRR from reuse of the DC and IN water supplied by desalination.

3. Influence of Demand on Cost Differences between the B1 and A1b Scenarios. The present application of the model simultaneously includes both the water supply and demand implications of the B1 and A1b scenarios. Analyses were not done of the separate influences of the supply and demand scenarios on costs. The possibly of the demand having more influence on the cost differences between scenarios was addressed by re-analyzing some nations of West Africa with their B1 and A1b demands with no changes in climate. West Africa was chosen as a region that typifies many climate change influences; increases in flows under climate change, increases in flow variances and demands in A1b conditions compared to B1 conditions.

For ease of analysis, the analysis was done for all the West African nations in the tables in the May 31, 2007 report except for Mali, Mauritania, Senegal, and Niger. The cost for the B1 demands and supplies is $1.89 E 09. The cost with B1 demands and 2000 supplies is $1.86 E 09. These are the incremental costs compared to meeting demands in 2000. The cost for the A1b demands and supplies is $2.11 E 09. The cost with A1b demands and 2000 supplies is $ 2.01E 09. Therefore in this case, given the similarities of the costs for meeting scenario demands with and without climate change, it appears that here demand increases dominate climate change stresses on water supply issues over the next 30 years. Vorosmarty et al (2000) had similar findings for the most of the world.

The summary in Table 5.1 also seems to show an extreme sensitivity of the cost estimates to the demand growth with less influence due to climate change. When examining a few nations in detail, however, it can be seen that the sensitivity of cost changes to climate and demand changes can vary on a nation by nation basis. For example, in the Dominican Republic, there is a slight decrease in demand from B1 to A1b and a slight increase in MAF from B1 to A1b, yet the cost of the A1b scenario is higher because of the higher flow variance in the A1b scenario. The cost difference in Ecuador is also due to the greater variance in scenario B1 compared to A1b. Reservoir requirements are very sensitive to annual flow variances, most of which increase more under A1b than B1. There are also situations similar to that in Mali; MAF flow, its variance, and demand increase from B1 to A1b. The increase in cost from B1 to A1b is due to both the variance increase and the demand increase. There are also situations similar to Bulgaria where demand increases and MAF and it variance decrease from B1 to A1B, yet the A1B cost is greater. This increase is probably due primarily to the demand increase. The A1B cost increase in Russia is due to demand increases requiring more ground water. Additional reservoir storage is not needed there in theory; reservoir yields can be increased by just increasing withdrawals. Therefore the impact on cost of climate or demand changes varies nation by nation. Finer spatial and temporal analyses beyond the scope of this analysis are necessary to definitely answer this question.

5.0 Financing

Much has been written about the challenges of financing Millennium Development Goal (MDG) Target 10 for halving “by 2015 the number of people without sustainable access to safe drinking water and basic sanitation “(eg, Toubkiss, 2006, Winpenny, 2003). As pointed out in Toubkiss (2006), none of eleven major reports from 2000 to 2005 covering this topic included major water supply (the subject of this report) and conveyance infrastructure. The eleven estimates ranged from $9 to $100 billion per year. A commonly accepted estimate is that meeting the most basic domestic water and sanitation goals would require an annual expenditure of $10 billion through 2015 (Winpenny, 2003). It appears none of the reports included climate change impacts on water supplies or demands. This is reasonable as domestic water demands are only a small portion of global water demands. Therefore the estimates here do not include the costs of meeting MGD 10, rather they complement it.

Briscoe (1999) presents estimates of the current annual expenditures for water-related infrastructure in developing countries: hydropower $15 billion, water supply and sanitation $25 billion, and irrigation and drainage $25 billion. Winpenny (2003) and Briscoe (1999) both state that the majority of present financing for all aspects of water resources use comes from public sources with Briscoe (1999) presenting estimates that 90 percent is from mainly public domestic sources and 10 percent from external sources. Both sources will be inadequate to meet future challenges as all investments have been estimated to have been stationary or perhaps declining in recent years. Therefore, more must be done to increase the amount of ODA aid to developing nations and the present, limited amount of private investment in water infrastructure.

Winpenny (2003) describes three categories of obstacles to increasing the financing water-related infrastructure and then presents many recommendations to overcome them. The major classes of obstacles include: governance; particular funding risks of the water sector such as low rate of return, capital intense with long payback period; and the large number of projects that can not get financed by any source because of project size or the credit risk of the borrower (called the "Exposed Segment").

$100 billion is the approximate difference in total capital costs between B1 and A1B (see Table 5.1). If this investment is averaged over next 23 years, the annual investment rate is approximately $4 billion. Most of this is required for countries in developing regions or in transition. As shown in Table 5.2, external bilateral and multilateral Overseas Development Assistance (ODA) for mainly water supply and sanitation has averaged approximately $US 6 billion in 2000 and 2005. It is not evident if this only includes the cost of water distribution or if costs of water production are also included. The value of $ 6 billion is in the range of 10 percent of the $25 billion water supply and sanitation total investments from Briscoe (1999); therefore both appear reasonably accurate. Therefore assuming 50 percent of ODA investments are for water supply or annually $3 billion, then this must be approximately doubled to meet the extra water production costs due to climate change. No country specific data were found for national investments.

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Appendix A

Notes for Tables in Section 4.

Scenario B1

W Africa

Generally sufficient water.

Niger and Mali – Moved 15 km3/yr from Mali to Niger to model transboundary (TB) river flow.

Senegal and Mauritania – Moved 6 km/yr from Senegal to Mauritania to model TB river flow. Assumed Mauritania uses desalination for all domestic and commercial use. Uses reclaimed water to make up deficit for irrigation.

East, Central, and North Africa

The Nile Basin

Presently most of this water is used by Egypt. Here it is assumed that by 2030 the water is more equitably shared in the basin.

Tanzania – Takes the water it needs and releases 40 km3/year north.

Uganda – Takes the water it needs and releases 20 km3/year north.

Ethiopia – Takes the water it needs and releases 90 km/year north.

Egypt – Gains 100 km3/year from upstream. Desalinates for 50 percent of industrial, commercial, urban water, reclaims all water used for these purposes.

Sudan – Gains 50 km3/year from upstream. Reclaims all industrial, commercial, urban water.

North Africa

Algeria – Desalination for all domestic and industrial needs, of which some is reclaimed.

Morocco – Uses desalination for all non –irrigation and reclaims it all.

Tunisia - Uses desalination for all non –irrigation and reclaims all of it.

S. America

No shortages.

Central America

Dominican Republic- Needs to reclaim 1 km3 of industrial water for irrigation.

Mexico – Must reclaim approximately 50 percent of urban and industrial water withdrawals.

Asia

Azerbaijan/Georgia – Moved some flow from Georgia to replicate flow from Georgia.

India/Nepal – Moved some flow from Nepal to India.

Israel- All industrial and domestic water from desalination. Approximately half is reclaimed and used for irrigation.

Jordan – Has no irrigation, must reclaim all industrial and domestic water use and use it for industrial use and is still short for industrial water by 0.4 km3/year.

Kazakhstan – Has to limit irrigation.

Pakistan – Essentially no irrigation. Reclaims all domestic and industrial water. Uses desalination.

Syria- Presently demands exceed renewable supplies. Must use desalination and reclaim all domestic and industrial water.

Oceania Developing

No data.

North America Developing

No data.

Europe/NA

In the aggregate, water rich area. In fact some countries given this aggregation will not need to increase reservoir capacity – rather just increase their water withdrawals. The aggregation also is misleading for the US where the aggregation does not pick up the differences between water availability in the nation nor the lost of storage because of snow pack loss. The same underestimation is probably the case in other snow climates as well.

Austria – Allocated some water from Danuabe to Romania via Hungary (20km3) and to Hungary (17 km3).

Romania- Received allocation from Austria via Hungary.

Ukraine – Received water from Russia (15km3) and Belarus (13km3).

Belarus – Transferred water to Ukraine.

Russia – Allocated some water to Ukraine.

Bulgaria- Recycles most of its industrial effluent.

Germany – Slight increase in industrial recycling.

Hungary – Water transfer from Austria (17km3).

Moldova – Heavy reuse and desalination.

Netherlands- Recycles 4 km3.

Spain- Slight water resuse.

Oceania Developed

Australia – No impacts under climate change. This is due to heterogeneity of supplies and demands in Australia.

A1b

Niger and Mali – Moved 15 km3/yr from Mali to Niger to model TB flow.

Senegal and Mauritania – Moved 6 km/yr from Senegal to Mauritania. Assumed Mauritania uses desalination for all domestic and commercial use. Uses reclaimed water to make up deficit for irrigation. Even though flows are higher under A1b, more storage is needed in Mauritania because coefficient of variation higher than under b1.

East and Central and Southern Africa

South Africa- due to severe decrease in MAR under CC, must decrease irrigation demands to about the present value . This is a relatively larger decease than b1.

The Nile Basin

Presently most of this water is used by Egypt. Here it is assumed that by 2030 the water is more equitably shared in the basin.

Tanzania – Takes the water it needs and releases 40 km3/year north.

Uganda – Takes the water it needs and releases 20 km3/year north.

Ethiopia – Takes the water it needs and releases 90 km/year north.

Egypt – Gains 100 km3/year from upstream. Desalinates 50 percent of industrial, commercial, urban water, reclaims all water used for these purposes.

Sudan – Gains 50 km3/year from upstream. Reclaims all industrial, commercial, urban water. Still short of water.

North Africa

Algeria – Desalination for all domestic and industrial needs, of which some is reclaimed.

Morocco – Uses desalination for all non –irrigation and reclaims all of it.

Tunisia - Uses desalination for all non –irrigation and reclaims all of it.

South America

Adequate water.

Central America

Asia

Azerbaijan/Georgia – Moved some flow from Georgia to replicate flow from Georgia.

India/Nepal – Moved some flow from Nepal to India.

Bangladesh – Hhas irrigation shortage, in fact less than now.

China – Because industrial demands increase so much under A1b, it faces a shortage in 2050. Solved by reclaiming 7km3 of urban water.

Jordan – Has no irrigation, must reclaim all industrial and domestic water use and use it for industrial use and is still short for industrial water by 0.4 km3/year. Has excess production capacity.

Kazakhstan – Has to limit irrigation. Has excess production capacity.

Pakistan – Essentially no irrigation. Reclaims half of domestic and industrial water. Uses desalination

Syria- Presently demands exceed renewable supplies. Must use desalination and reclaim all domestic and industrial water.

Oceania Developing

No data.

North America Developing

No data.

Austria – Allocated some water to Romania via Hungary (20km3) and to Hungary (17 km3).

Romania - Received allocation from Austria via Hungary (20km3).

Ukraine – Received water from Russia (15km3) and Belarus (13km3).

Belarus – Transferred water to Ukraine.

Russia – Allocated some water to Ukraine.

Bulgaria- Recycles most of its industrial effluent.

Germany – Larger increase in industrial recycling compared to B1.

Hungary – Water transfer from Austria (17km3).

Moldova – Heavy reuse and desalination.

Netherlands- Recycles 4 km3.

Spain- Slight water resuse.

Portugal – Must recycle wastewater and use virtual water. Large supply drop compared to B1.

Table 2.1: 2050 Irrigation Requireme nts

	Scenario	Ratio 2050/2000
AFF(Subsaharan)	a1b	2.56
	b1	2.16
LAM (Latin America)	a1b	1.81
	b1	1.87
MEA (MiddleEast, N Africa)	a1b	1.25
	b1	1.20
EEU and FSU (Eastern Eu	a1b	2.95
and FSU	b1	2.48
CPA (East Asia)	a1b	1.21
	b1	1.23
SAS (South Asia)	a1b	1.19
	b1	1.17
PAS (Developing Ctries, SE Asia)	a1b	1.31
	b1	1.21
North America	a1b	1.19
	b1	1.32
Europe (WEU)	a1b	1.39
	b1	1.11
Developed Pacific (PAO)	a1b	1.53
	b1	0.98

Table 3.1: Water Production Costs ($US, 2000)

Region	Reservoirs	Production Well	Desalination	Reclaimed Water
	$/km3 active storage	$/km3/year	$/km/year	$/km/year
Africa	3.08E+08	1.88E+08	1.12E+09	6.19E+08
Latin America	3.57E+08	2.17E+08	1.30E+09	7.17E+08
Asia	3.15E+08	1.92E+08	1.15E+09	6.33E+08
US/Europe	4.50E+08	2.74E+08	1.64E+09	9.04E+08

Table 4.1WA: Mean Annual Flows (MAF) and Standard Deviation (SD), km3/year

West Africa

	2000 MAF	2000 SD	B1 2050 MAF	B1 2050 SD	A1b 2050 MAF	A1b 2050 SD
Benin	10.3	1.81	10.58	2.91	11.30	4.11
Burkina Faso	12.5	2.48	13.76	3.36	16.00	7.27
Côte d'Ivoire	76.84	10.50	77.22	11.71	81.80	18.67
Ghana	30.3	6.46	30.95	8.36	34.12	12.12
Guinea	226	30.84	231.24	47.18	270.28	89.55
Guinea-Bissau	16	23.62	24.20	19.08	15.55	19.19
Liberia	200	19.46	211.03	29.75	224.32	39.17
Mali	45	8.61	50.00	12.69	61.00	17.72
Mauritania	6.4	4.52	6.50	7.43	6.60	10.06
Niger	18	4.56	18.00	6.47	19.00	7.46
Nigeria	221	30.56	230.65	42.93	239.34	60.31
Senegal	20	8.45	20.00	13.90	28.00	15.44
Sierra Leone	160	19.04	170.54	29.41	190.35	46.95
Togo	11.5	2.28	11.77	3.65	12.78	5.14

Table 4.2WA: Water Withdrawals (km3/year), West Africa

	2000	SRES B1 2050	SRES A1b 2050
Benin	0.13	1.39	1.42
Burkina Faso	0.8	3.08	3.35
Côte d'Ivoire	0.93	5.33	5.57
Ghana	0.982	5.22	5.48
Guinea	1.51	4.54	5.08
Guinea-Bissau	0.18	0.63	0.69
Liberia	0.11	1.14	1.16
Mali	6.55	15.70	18.06
Mauritania	1.7	4.71	5.31
Niger	2.18	6.51	7.35
Nigeria	8.01	40.14	42.34
Senegal	2.22	6.55	7.37
Sierra Leone	0.38	1.35	1.49
Togo	0.169	1.02	1.05

Table 4.3 WA: Incremental Sources and Total Capital Costs, Scenario B1, West Africa

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Benin	1.35	0.39	0	0	0	0	7.34E+07
Burkina Faso	13.76	0.48	0	0	0	0	9.43E+07
Côte d'Ivoire	0.00	0.92	0	0	0	0	1.73E+08
Gambia	0.00	0.04	0	0	0	0	7.28E+06
Ghana	17.11	0.47	0	0	0	0	9.47E+07
Guinea	0.00	0.14	0	0	0	0	2.63E+07
Guinea-Bissau	0.00	0.08	0	0	0	0	1.46E+07
Liberia	0.00	0.22	0	0	0	0	4.06E+07
Mali	802.72	0.14	0	0	0	0	2.98E+08
Mauritania	1432.29	0.30	1.3	0.84	0	0	2.29E+09
Niger	570.20	0.20	0	0	0	0	2.30E+08
Nigeria	81.97	6.75	0	0	0	0	1.29E+09
Senegal	1249.54	0.58	0	0	0	0	5.33E+08
Sierra Leone	0.00	0.20	0	0	0	0	3.82E+07
Togo	0.00	0.18	0	0	0	0	3.34E+07
Total	4168.94	11.09	1.3	0.84	0	0	5.24E+09

Table 4.4WA: Incremental Sources and Total Capital Costs, Scenario A1b, West Africa

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Benin	3.11	0.40	0	0	0	0	75341944
Burkina Faso	82.69	0.54	0	0	0	0	1.29E+08
Côte d'Ivoire	0.00	0.97	0	0	0	0	1.83E+08
Gambia	0.00	0.04	0	0	0	0	7592217
Ghana	47.26	0.50	0	0	0	0	1.1E+08
Guinea	0.00	0.17	0	0	0	0	31051391
Guinea-Bissau	0.00	0.09	0	0	0	0	16404421
Liberia	0.00	0.22	0	0	0	0	41500199
Mali	1163.03	0.18	0	0	0	0	4.27E+08
Mauritania	3888.52	0.10	1.7	1	0	0	3.51E+09
Niger	958.09	0.24	0	0	0	0	3.69E+08
Nigeria	256.63	7.21	0	0	0	0	1.44E+09
Senegal	582.76	0.70	0	0	0	0	3.28E+08
Sierra Leone	0.00	0.23	0	0	0	0	43723516
Togo	0.00	0.18	0	0	0	0	34552462
Total	6982.09	11.76	1.7	1	0	0	6.75E+09

Table 4.5WA: Approximated Incremental Total Capital Costs for Countries Lacking Sufficient, West Africa

	Rural population (1000 inhab)	Urban population (1000 inhab)	b1 cost per person	Total Cost	A1b cost per person	Total Cost
Cape Verde	205	249	5.2	2.36E+06	5.3	4.54E+06
Saint Helena	3	2	5.2	2.60E+04	5.3	5.00E+04
Total				2.39E+06		4.59E+06

Table 4.1NECSA: Mean Annual Flows (MAF) and Standard Deviation (SD), km3/year

North, East, Central, South Africa

	2000 MAF	2000 SD	B1 2050 MAF	B1 2050 SD	A1b 2050 MAF	A1b 2050 SD
Angola	148	16.77	141.35	16.10	129.82	21.90
Cameroon	273	23.34	282.27	28.06	282.59	35.80
Central African Republic	141	15.47	147.68	16.98	155.41	27.82
Chad	15	2.52	15.72	3.29	16.84	3.55
Congo, Dem Republic of	900	73.89	920.96	84.98	914.23	121.11
Congo, Republic of	222	16.81	222.46	22.80	212.84	28.44
Equatorial Guinea	26	1.97	27.11	3.15	26.54	3.88
Gabon	164	11.24	165.42	16.41	159.04	21.43
Burundi	10.06	1.04	10.47	1.46	10.49	1.05
Djibouti	0.3	0.12	0.41	0.24	0.42	0.20
Ethiopia	32	3.70	43.00	5.30	46.00	6.96
Kenya	20.7	3.70	23.16	5.97	24.71	6.39
Madagascar	337	56.83	350.12	103.01	335.59	87.71
Malawi	16.14	3.69	15.57	6.03	18.59	7.28
Mozambique	100.3	15.04	97.86	27.84	101.79	36.23
Rwanda	9.5	1.03	9.86	1.45	9.92	1.08
Somalia	6	1.60	7.67	2.54	7.85	2.22
Tanzania, United Rep of	44	7.86	46.00	9.01	53.00	7.26
Uganda	19	2.70	21.00	4.16	22.00	3.35
Zambia	80.2	11.05	79.29	18.33	86.25	15.69
Zimbabwe	12.26	3.03	12.31	4.62	12.53	5.52
Botswana	2.4	0.74	1.79	0.52	1.89	0.42
Namibia	6.16	1.50	5.03	0.97	5.12	1.49
Swaziland	2.64	0.70	2.02	0.68	2.19	0.73

South Africa	44.8	9.08	34.81	6.34	35.34	6.66
Lesotho	5.23	1.29	4.01	0.93	3.93	1.17
Algeria	11.25	6.77	14.89	9.44	10.69	6.41
Egypt	102	10.00	103.00	15.00	105.40	15.00
Libyan Arab Jamahiriya	0.6	0.49	0.63	0.98	0.73	1.06
Sudan	80	8.41	82.00	9.69	84.00	25.00
Morocco	29	10.84	45.11	40.94	33.03	29.13
Tunisia	4.195	2.73	3.85	3.29	3.51	3.12

Table 4.2NECSA: Water Withdrawals (km3/year),

North, East, Central, South Africa

	2000	SRES B1 2050	SRES A1b 2050
Angola	0.35	2.91	2.99
Cameroon	0.99	4.59	4.88
Central African Republic	0.03	0.47	0.47
Chad	0.23	1.22	1.29
Congo, Dem Republic of	0.36	5.76	5.81
Congo, Republic of	0.05	1.25	1.25
Equatorial Guinea	0.11	0.32	0.32
Gabon	0.12	0.42	0.44
Burundi	0.29	1.67	1.76
Djibouti	0.02	0.07	0.07
Ethiopia	5.56	15.87	17.95
Kenya	1.58	7.51	7.91
Madagascar	14.96	36.67	42.39
Malawi	1.01	4.00	4.32
Mozambique	0.63	2.38	2.60
Rwanda	0.15	1.20	1.24
Somalia	3.29	7.37	8.68
Tanzania, United Rep of	5.18	14.26	16.11
Uganda	0.3	3.81	3.85
Zambia	1.74	6.06	6.59
adjusted Zimbabwe	4.21	12.68	14.01
Botswana	0.19	0.75	0.79
Namibia	0.3	0.99	1.07
Swaziland	1.04	2.40	2.80
South Africa	12.50	30.66	33.79
Lesotho	0.05	0.42	0.43

Algeria	6.07	23.48	25.05
Egypt	68.3	193.90	217.50
Libyan Arab Jamahiriya	4.27	10.53	11.94
Sudan	37.32	87.59	102.02
Morocco	12.6	34.55	38.95
Tunisia	2.64	7.43	8.30

Table 4.3NECSA: Incremental Sources and Total Capital Costs, Scenario B1
North, East, Central, South Africa

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Angola	0.00	0.05	0	0	0	0	9.73E+06
Cameroon	0.00	0.07	0	0	0	0	1.24E+07
Central African Republic	0.00	0.01	0	0	0	0	1.66E+06
Chad	0.00	0.43	0	0	0	0	8.06E+07
Congo, Dem Republic of	0.00	2.32	0	0	0	0	4.36E+08
Congo, Republic of	0.00	0.52	0	0	0	0	9.78E+07
Equatorial Guinea	0.00	0.01	0	0	0	0	1.56E+06
Gabon	0.00	0.13	0	0	0	0	2.42E+07
Burundi	0.18	0.41	0	0	0	0	7.77E+07
Djibouti	0.16	0.00	0	0	0	0	2.43E+05
Ethiopia	304.02	0.17	0	0	0	0	1.35E+08
Kenya	191.85	0.14	0	0	0	0	9.19E+07
Madagascar	0.00	0.43	0	0	0	0	8.14E+07
Malawi	82.99	0.90	0	0	0	0	1.96E+08
Mozambique	0.00	0.05	0	0	0	0	9.82E+06
Rwanda	0.00	0.32	0	0	0	0	5.92E+07
Somalia	326.02	0.08	0.02	0	1.5	4.182763	1.38E+08
Tanzania, United Rep of	286.11	0.43	0	0	0	0	1.78E+08
Uganda	15.21	0.07	0	0	0	0	1.83E+07
Zambia	0.00	0.17	0	0	0	0	3.26E+07
Zimbabwe	515.82	0.00	0.81	0	1.875	7.30842988	6.76E+08
Botswana	7.14	0.36	0	0	0	0	6.94E+07
Namibia	0.00	0.30	0	0	0	0	5.58E+07
Swaziland	22.26	0.00	0.03	0	0.4	1.5357925	2.61E+07
South Africa	114.42	0.78	2.02849486	0	5	16.6030397	1.44E+09
Lesotho	0.00	0.30	0	0	0	0	5.58E+07
Algeria	475.35	0.10	3	15	0	0	1.89E+10
Egypt	560.73	0.00	65	30	69	58	7.41E+10
Sudan	155.87	0.40	9	0	33	45	5.70E+09
Morocco	9762.30	0.83	6	10.5	0	0	1.90E+10
Tunisia	71.97	0.00	2.7	2.7	4.1	0.5	4.73E+09
Total	12892.41	9.79	88.59	58.20	114.88	133.13	1.26E+11

Table 4.4NECSA: Incremental Sources and Total Capital Costs, Scenario A1b North, East, Central, South Africa

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Angola	0	0.05	0	0.00E+00	0	0	1.00E+07
Cameroon	0	0.07	0	0.00E+00	0	0	1.34E+07
Central African Republic	0	0.01	0	0.00E+00	0	0	1.66E+06
Chad	0	0.46	0	0.00E+00	0	0	8.68E+07
Congo, Dem Republic of	0	2.34	0	0.00E+00	0	0	4.39E+08
Congo, Republic of	0	0.52	0	0.00E+00	0	0	9.80E+07
Equatorial Guinea	0	0.01	0	0.00E+00	0	0	1.56E+06
Gabon	0	0.14	0	0.00E+00	0	0	2.58E+07
Burundi	0	0.44	0	0.00E+00	0	0	8.27E+07
Djibouti	0.04	0.00	0	0.00E+00	0	0	2.07E+05
Ethiopia	644.20	0.20	0	0.00E+00	0	0	2.56E+08
Kenya	218.07	0.15	0	0.00E+00	0	0	1.03E+08
Madagascar	163.78	0.55	0	0.00E+00	0	0	1.58E+08
Malawi	79.88	0.99	0	0.00E+00	0	0	2.13E+08
Mozambique	0.00	0.06	0	0.00E+00	0	0	1.11E+07
Rwanda	0.00	0.33	0	0.00E+00	0	0	6.15E+07
Somalia	417.25	0.11	0.018	0.00E+00	1.75	4.968523	1.73E+08
Tanzania, United Rep of	125.08	0.52	0.000	0.00E+00	0	0	1.40E+08
Uganda	6.07	0.07	0.000	0.00E+00	0	0	1.54E+07
Zambia	0.00	0.20	0.000	0.00E+00	0	0	3.66E+07
adjusted Zimbabwe	689.65	0.00	0.810	0.00E+00	1.875	8.63562988	7.35E+08
adju Botswana	5.21	0.38	0.000	0.00E+00	0	0	7.25E+07
Namibia	3.67	0.33	0.000	0.00E+00	0	0	6.39E+07
Swaziland	14.72	0.00	0.030	0.00E+00	0.4	1.9381925	2.35E+07
South Africa	125.60	0.78	2.028	0.00E+00	5	19.7374397	1.44E+09
Lesotho	0.00	0.30	0.000	0.00E+00	0	0	5.64E+07
Algeria	205.80	0.10	5.000	1.50E+01	0	0	2.00E+10
Egypt	565.16	0.00	65.000	3.00E+01	71	81	7.41E+10
Sudan	3311.01	0.52	9	0.00E+00	34	58	6.79E+09
Morocco	9031.65	0.00	10.5	1.05E+01	11	17	2.13E+10
Tunisia	113.41	0.00	2.7	2.70E+00	3.8	1.7	4.74E+09
Total	15720.25	9.64	95.09	58.20	128.83	192.98	1.31E+11

Table 4.5NECSA: Approximated Total Capital Costs for Nations Lacking Data, North, East, Central, South Africa

	Rural population (1000 inhab)	Urban population (1000 inhab)	B1 Cost/person	B1 Total Cost $	A1b Cost/person	A1b Total Cost $
Sao Tome and Principe	98	59		insufficent data		insufficent data
				insufficent data		insufficent data
British Indian Ocean Ter				insufficent data		insufficent data
Comoros	490	257		insufficent data		insufficent data
Eritrea	3215	776	1.95	7.78E+06	4.23	1.69E+07
Ethiopia PDR				insufficent data		insufficent data
Mauritius	687	523		insufficent data		insufficent data
Réunion	68	677		insufficent data		insufficent data
Seychelles	40	40		insufficent data		insufficent data
Western Sahara	20	281		insufficent data		insufficent data
Total				7.78E+06		1.69E+07

Table 4.1A: Mean Annual Flows (MAF) and Standard Deviation (SD), km3/year, Asia

	2000 MAF	2000 SD	B1 2050 MAF	B1 2050 SD	A1b 2050 MAF	A1b 2050 SD
Afghanistan	55	12.28	49.60	14.75	42.76	14.40
Armenia	9.071	1.71	7.50	1.86	6.89	1.49
Azerbaijan, Republic of	38	7.00	29.00	6.50	28.00	6.81
Bangladesh	105	13.32	111.24	16.78	116.99	18.10
Bhutan	95	14.97	101.34	18.86	94.74	22.37
Cambodia	120.6	15.27	127.98	28.99	133.69	34.40
China	2812	134.07	3021.21	165.56	3089.75	255.83
Georgia	28	5.80	25.00	6.35	24.00	4.77
India	1401	127.88	1573.00	153.90	1582.00	210.79
Indonesia	2838	221.94	3052.49	330.06	3118.84	466.45
Iran, Islamic Rep of	128.5	30.66	111.35	49.57	105.77	39.74
Iraq	35.2	8.40	57.93	25.79	68.97	25.91
Israel	0.75	0.19	0.56	0.19	0.54	0.16
Japan	430	54.41	477.03	66.98	480.28	63.76
Jordan	0.68	0.91	1.16	5.18	1.04	5.15
Kazakhstan	46.45	8.21	45.75	13.92	46.49	14.82
Korea, Dem People's Rep	67	12.23	73.34	14.39	76.77	22.61
Korea, Republic of	64.85	17.23	74.46	21.13	77.53	23.16
Kyrgyzstan	46.45	8.21	45.75	13.92	46.49	14.82
Laos	190.4	31.12	200.57	44.03	225.27	61.77
Lebanon	4.8	6.43	2.65	1.70	2.56	1.47
Malaysia	580	57.68	622.87	108.55	680.33	172.55
Mongolia	34.8	3.17	36.86	4.61	37.76	4.72
Nepal	58	12.41	58.00	15.93	49.00	13.85
pakistan	52.4	9.90	53.78	13.35	48.01	15.23
Philippines	479	59.37	474.60	48.24	528.80	120.78
Saudi Arabia	2.4	0.98	2.68	1.68	3.69	2.85
Sri Lanka	50	14.93	58.68	29.48	91.33	146.61
Syrian Arab Republic	7	9.38	15.78	10.15	3.73	2.14
Tajikistan	66.3	11.82	62.42	15.49	60.26	21.31
Thailand	210	28.63	224.49	44.34	246.14	72.85
Turkey	227	43.27	167.74	37.47	156.21	43.47
Uzbekistan	16.34	3.76	14.84	6.22	13.92	5.39
Viet Nam	366.5	37.14	387.05	55.28	411.58	69.64
Yemen	4.1	1.81	5.13	2.68	6.80	6.15

Table 4.2A: Water Withdrawals (km3/year), Asia

	2000	SRES B1 2050	SRES A1b 2050
Afghanistan	23.26	30.67	31.81
Armenia	2.95	4.20	4.30
Azerbaijan, Republic of	17.25	38.06	42.72
Bangladesh	79.4	111.28	112.81
Bhutan	0.425	0.74	0.75
Cambodia	4.08	5.32	6.11
China	630.37	1006.14	1243.01
Georgia	3.61	8.26	9.11
India	645.85	894.45	950.69
Indonesia	82.78	118.74	126.30
Iran, Islamic Rep of	72.88	115.98	119.30
Iraq	42.7	78.12	80.09
Israel	2.05	5.35	5.41
Japan	88.43	102.02	111.91
Jordan	1.01	2.91	2.95
Kazakhstan	35	83.24	94.69
Korea, Dem People's Rep	9.02	13.31	16.53
Korea, Republic of	18.59	24.71	28.81
Kyrgyzstan	10.08	24.25	28.70
Laos	3	4.22	4.89
Lebanon	1.38	3.13	3.18
Malaysia	9.02	14.28	14.78
Mongolia	0.44	0.84	1.01
Nepal	10.18	15.38	15.57
pakistan	169.44	227.88	231.14
Philippines	28.52	47.37	54.09
Saudi Arabia	17.32	29.11	29.88
Sri Lanka	12.61	16.60	16.84
Syrian Arab Republic	19.95	31.08	32.03
Tajikistan	11.96	29.17	33.55
Thailand	87.06	111.14	121.90
Turkey	37.53	55.54	56.93
Uzbekistan	58.34	143.35	165.10
Viet Nam	71.39	104.04	135.95
Yemen	6.63	9.80	11.34

Table 4.3A: Incremental Sources and Total Capital Costs, Scenario B1, Asia

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	Desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Afghanistan	813.60	0.67	0	0	17	10	4.11E+08
Armenia	17.97	0.00	0.81	0	1.4	0.38	5.18E+08
Azerbaijan, Republic of	13.39	0.00	4	0	6	23	2.54E+09
Bangladesh	0.00	0.00	9	0	32	57	5.70E+09
Bhutan	0.00	0.00	0	0	0	0	0.00E+00
Cambodia	0.00	0.05	0	0	0	0	9.04E+06
China	3722.14	31.53	0	0	0	0	7.34E+09
Georgia	7.01	3.86	0	0	0	0	7.43E+08
India	964.01	13.78	110	0	596	57	7.26E+10
Indonesia	0.00	1.88	0	0	0	0	3.61E+08
Iran, Islamic Rep of	1559.39	0.00	18	0	26	54	1.19E+10
Iraq	158.09	0.17	15	6	15	32	1.65E+10
Israel	0.00	0.00	1.3	3.8	0	0	5.19E+09
Japan	0.00	2.09	0	0	0	0	4.01E+08
Jordan	0.00	0.00	0.8	0	0	0.9	5.06E+08
Kazakhstan	1128.52	0.00	5	0	11.6	60	3.56E+09
Korea, Dem People's Rep	0.00	1.19	0	0	0	0	2.28E+08
Korea, Republic of	744.23	0.25	0	0	0	0	3.05E+08
Kyrgyzstan	2576.95	0.00	0	0	17.6	6	8.93E+08
Laos	0.00	0.00	0	0	0	0	0.00E+00
Lebanon	0.00	0.00	0	2	0	0	2.30E+09
Malaysia	0.00	0.23	0	0	0	0	4.47E+07
Mongolia	0.00	0.40	0	0	0	0	7.59E+07
Nepal	167.60	0.00	0	0	0	0	5.81E+07
Pakistan	0.00	0.00	24	10	17	173	2.67E+10
Philippines	0.00	2.64	0	0	0	0	5.07E+08
Saudi Arabia	0.00	0.00	0	28	0	0	3.21E+10
Sri Lanka	1654.92	0.06	0	0	0	0	5.86E+08
Syrian Arab Republic	0.00	0.70	8	8	8	15	1.44E+10
Tajikistan	1628.18	3.13	0	0	23	4	1.16E+09
Thailand	5755.88	0.19	5	5	90	11	1.09E+10
Turkey	765.12	3.65	0	0	0	0	9.65E+08
Uzbekistan	0.00	0.00	7	0	7	129	4.43E+09
Viet Nam	1449.28	0.37	0	0	0	0	5.72E+08
Yemen	0.00	0.00	1.5	1.5	1.5	6	2.67E+09
Total	23126.28	66.84	209.41	64.30	869.10	638.28	2.27E+11

Table 4.4A: Incremental Sources and Total Capital Costs, Scenario A1b, Asia

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Afghanistan	921.90	0.00	0.00	0	14	14	3.19E+08
Armenia	0.00	0.00	0.81	0	1.7	0.73	5.12E+08
Azerbaijan, Republic of	113.23	0.00	4.00	0	5	29	2.57E+09
Bangladesh	0.00	0.00	10.00	0	35	56	6.33E+09
Bhutan	0.00	0.00	0.00	0	0	0	0.00E+00
Cambodia	0.00	0.08	0.00	0	0	0	1.48E+07
China	19587.28	51.41	7.00	0	0	0	2.11E+10
Georgia	8.04	4.57	0.00	0	0	0	8.79E+08
India	4942.61	12.22	135.00	0	481	183	8.95E+10
Indonesia	0.00	2.00	0.00	0	0	0	3.84E+08
Iran, Islamic Rep of	418.48	0.00	18.00	0	24	59	1.15E+10
Iraq	0.00	1.18	15.00	6	15	34	1.66E+10
Israel	0.00	0.00	1.30	3.7	0	0	5.07E+09
Japan	0.00	3.61	0.00	0	0	0	6.93E+08
Jordan	214.72	0.00	0.80	0	0	0.95	5.81E+08
Kazakhstan	1242.99	0.00	5.00	0	12	72	3.59E+09
Korea, Dem People's Rep	203.13	2.08	0.00	0	0	0	4.70E+08
Korea, Republic of	1792.63	0.41	0.00	0	0	0	7.00E+08
Kyrgyzstan	2732.02	0.00	0.00	0	17.6	6	9.47E+08
Laos	0.00	0.00	0.00	0	0	0	0.00E+00
Lebanon	0.00	0.00	0.00	2	0	0	2.30E+09
Malaysia	0.00	0.26	0.00	0	0	0	4.90E+07
Mongolia	0.00	0.57	0.00	0	0	0	1.10E+08
Nepal	521.97	0.00	0.00	0	0	0	1.81E+08
Pakistan	0.00	0.00	24.00	10	17	176	2.67E+10
Philippines	0.00	3.59	0.00	0	0	0	6.88E+08
Saudi Arabia	0.00	0.00	0.00	28	0	0	3.21E+10
Sri Lanka	7357.25	0.07	0.00	0	0	0	2.56E+09
Syrian Arab Republic	0.00	0.00	8.00	8	8	15.6625	1.42E+10
Tajikistan	2805.66	3.13	0.00	0	22.5	9.284	1.57E+09
Thailand	12830.98	0.28	6.00	6	91	10	1.52E+10
Turkey	2098.48	3.93	0.00	0	0	0	1.48E+09
Uzbekistan	0.00	0.00	7.00	0	7	151	4.43E+09
Viet Nam	5228.60	0.72	0.00	0	0	0	1.95E+09
Yemen	0.00	0.00	1.50	3	1.5	6.4	4.39E+09
Total	63019.96	90.11	243.41	66.70	752.30	823.03	2.70E+11

Table 4.5A: Approximated Incremental Total Capital Costs for Nations Lacking Data, Asia

	Rural population (1000 inhab)	Urban population (1000 inhab)	B1 Cost/person	B1 Total Cost $	A1b Cost/person	A1b Total Cost $
Bahrain	71	638	187	1.33E+08	253	1.79E+08
Brunei Darussalam	86	264	187	6.55E+07	253	8.86E+07
Cyprus	247	549	187	1.49E+08	253	2.01E+08
Gaza Strip (Palestine)	59	1018	187	2.01E+08	253	2.72E+08
Kuwait	83	2360	187	4.57E+08	253	6.18E+08
Maldives	221	88	187	5.78E+07	253	7.82E+07
Myanmar	34728	14124	187	9.14E+09	253	1.24E+10
Oman	644	2125	187	5.18E+08	253	7.01E+08
Qatar	49	552	187	1.12E+08	253	1.52E+08
Singapore	0	4183	176	7.36E+08	244	1.02E+09
Timor-Leste	686	53	176	1.30E+08	244	1.80E+08
Turkmenistan	2630	2164	187	8.96E+08	253	1.21E+09
United Arab Emirates	444	2493	187	5.49E+08	253	7.43E+08
Total				1.31E+10		1.78E+10

Table 4.1SA: Mean Annual Flows (MAF) and Standard Deviation (SD), km3/year, South America

	2000 MAF	2000 SD	B1 2050 MAF	B1 2050 SD	A1b 2050 MAF	A1b 2050 SD
Argentina	276	20.3	268.9	21.3	266.6	21.6
Bolivia	303.5	20.5	302.8	35.6	305.2	32.3
Brazil	5418	542.2	5364.2	518.3	5509.9	661.3
Chile	884	41.6	839.4	44.9	830.4	66.0
Colombia	2112	189.9	2106.9	224.8	2150.0	317.3
Ecuador	432	35.7	444.7	52.8	454.2	44.3
Guyana	241	194.9	203.2	34.7	248.7	331.6
Paraguay	94	17.6	100.9	31.0	101.8	27.1
Peru	1616	104.9	1669.4	116.9	1720.7	140.2
Suriname	88	57.3	79.8	22.1	96.3	106.2
Uruguay	59	40.0	76.8	52.3	82.1	40.8
Venezuela,Bolivar Rep of	722.5	86.3	689.9	124.0	695.8	133.2

Table 4.2SA. Water Withdrawals (km3/year), South America

	2000	SRES B1 2050	SRES A1b 2050
Argentina	29.19	83.47	82.18
Bolivia	1.44	4.53	4.46
Brazil	59.3	227.74	225.54
Chile	12.55	57.14	56.66
Colombia	10.71	28.81	28.51
Ecuador	16.98	42.51	41.67
Guyana	1.64	3.16	3.07
Paraguay	0.49	1.85	1.83
Peru	20.13	60.63	59.65
Suriname	0.67	1.47	1.43
Uruguay	3.15	6.31	6.13
Venezuela, Bolivar Rep of	8.37	22.99	22.75

Table 4.3SA: Incremental Sources and Total Capital Costs, Scenario B1, South America

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Argentina	548.99	8.74	0	0	0	0	2.12E+09
Bolivia	0.00	0.27	0	0	0	0	5.79E+07
Brazil	0.00	22.72	0	0	0	0	4.94E+09
Chile	0.00	5.80	0	0	0	0	1.26E+09
Colombia	0.00	2.35	0	0	0	0	5.11E+08
Ecuador	0.00	3.32	0	0	0	0	7.21E+08
Guyana	0.00	0.20	0	0	0	0	4.31E+07
Paraguay	0.00	0.18	0	0	0	0	3.83E+07
Peru	0.00	5.27	0	0	0	0	1.14E+09
Suriname	0.00	0.10	0	0	0	0	2.25E+07
Uruguay	0.00	0.41	0	0	0	0	8.93E+07
Venezuela,Bolivar Rep of	0.00	1.90	0	0	0	0	4.13E+08
Total	548.99	51.25	0.00	0.00	0.00	0.00	1.14E+10

Table 4.4SA: Incremental Sources and Total Capital Costs, Scenario A1b, South America

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Argentina	555.64	8.53	0	0	0	0	2.07E+09
Bolivia	0.00	0.26	0	0	0	0	5.66E+07
Brazil	0.00	22.43	0	0	0	0	4.88E+09
Chile	0.00	5.73	0	0	0	0	1.25E+09
Colombia	0.00	2.31	0	0	0	0	5.03E+08
Ecuador	0.00	3.21	0	0	0	0	6.98E+08
Guyana	0.00	0.19	0	0	0	0	4.03E+07
Paraguay	0.00	0.17	0	0	0	0	3.77E+07
Peru	0.00	5.14	0	0	0	0	1.12E+09
Suriname	0.00	0.10	0	0	0	0	2.15E+07
Uruguay	0.00	0.39	0	0	0	0	8.42E+07
Venezuela,Bolivar Rep of	0.00	1.87	0	0	0	0	4.06E+08
Total	555.64	50.33	0.00	0.00	0.00	0.00	1.12E+10

Table 4.5SA: Approximated Incremental Total Capital Costs for Nations Lacking Data, South America

	Rural population (1000 inhab)	Urban population (1000 inhab)	B1 Cost/person	B1 Total Cost $	A1b Cost/person	A1b Total Cost $
Falkland Is (Malvinas)				insufficent data		insufficent data
French Guiana				insufficent data		insufficent data

Table 4.1C: Mean Annual Flows (MAF) and Standard Deviation (SD), km3/year, Caribbean

	2000 MAF	2000 SD	B1 2050 MAF	B1 2050 SD	A1b 2050 MAF	A1b 2050 SD
Belize	16	4.41	14.50	4.58	14.90	7.21
Costa Rica	112.4	24.35	107.08	31.88	112.39	62.69
Cuba	38.12	6.53	33.01	9.90	28.45	8.58
Dominican Republic	20.99	6.93	14.76	4.44	14.87	5.50
El Salvador	17.75	4.20	16.95	5.29	16.92	7.83
Guatemala	109.2	26.81	90.19	22.98	96.21	56.84
Haiti	13.01	4.09	9.20	2.94	9.43	3.38
Honduras	95.93	20.89	86.82	23.95	85.79	35.21
Mexico	409	84.15	333.46	50.59	363.93	110.48
Nicaragua	189.7	49.96	176.53	47.63	180.29	108.35
Panama	147.4	28.86	135.46	37.64	139.10	69.22

Table 4.2C: Water Withdrawals (km3/year), Caribbean

	2000	SRES B1 2050	SRES A1b 2050
Belize	0.15	1.47	1.47
Costa Rica	2.68	10.40	10.31
Cuba	8.2	26.20	25.86
Dominican Republic	3.39	7.07	6.94
El Salvador	1.28	4.97	4.92
Guatemala	2.01	7.95	7.85
Haiti	0.99	2.51	2.46
Honduras	0.86	3.32	3.28
Mexico	78.22	193.04	189.42
Nicaragua	1.3	2.82	2.75
Panama	0.82	1.90	1.88

Table 4.3C: Incremental Sources and Total Capital Costs, Scenario B1, Caribbean

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Belize	4.7	0.4	0.0	0.0	0.0	0.0	9.17E+07
Costa Rica	0.0	2.6	0.0	0.0	0.0	0.0	5.57E+08
Cuba	287.2	2.6	13.0	0.0	0.0	0.0	6.95E+08
Dominican Republic	320.1	0.0	1.0	0.0	0.0	0.0	1.26E+08
El Salvador	305.8	0.0	0.0	0.0	0.0	0.0	1.27E+08
Guatemala	0.0	0.5	0.0	0.0	0.0	0.0	1.00E+08
Haiti	36.1	0.3	0.0	0.0	0.0	0.0	6.92E+07
Honduras	0.0	0.2	0.0	0.0	0.0	0.0	5.02E+07
Mexico	1701.3	13.3	60.0	0.0	0.0	0.0	3.59E+09
Nicaragua	0.0	0.0	0.0	0.0	0.0	0.0	6.95E+06
Panama	0.0	0.0	0.0	0.0	0.0	0.0	5.24E+06
Total	2655.11	19.90	74.00	0.00	0.00	0.00	5.42E+09

Table 4.4C: Incremental Sources and Total Capital Costs, Scenario A1b, Caribbean

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Belize	13.45	0.41	0.00	0.00	0.00	0.00	9.50E+07
Costa Rica	56.34	2.53	0.00	0.00	0.00	0.00	5.73E+08
Cuba	195.56	1.64	15.00	0.00	0.00	0.00	4.43E+08
Dominican Republic	459.05	0.00	1.00	0.00	0.00	0.00	1.81E+08
El Salvador	590.72	0.03	0.00	0.00	0.00	0.00	2.39E+08
Guatemala	37.08	0.45	0.00	0.00	0.00	0.00	1.13E+08
Haiti	42.58	0.24	0.00	0.00	0.00	0.00	6.97E+07
Honduras	0.00	0.23	0.00	0.00	0.00	0.00	4.93E+07
Mexico	8748.00	15.26	43.00	0.00	0.00	0.00	6.78E+09
Nicaragua	0.00	0.03	0.00	0.00	0.00	0.00	6.65E+06
Panama	0.00	0.02	0.00	0.00	0.00	0.00	5.17E+06
Total	10142.78	20.85	59.00	0.00	0.00	0.00	8.56E+09

Table 4.5C: Approximated Incremental Total Capital Costs for Nations Lacking Data, Caribbean

	Rural population (1000 inhab)	Urban population (1000 inhab)	B1 cost/person	B1 Cost ($)	A1b cost/person	A1b Cost ($)
Anguilla	0	12	15	1.80E+05	21	2.52E+05
Antigua and Barbuda	45	27	15	1.08E+06	21	1.51E+06
Aruba	52	45	15	1.46E+06	21	2.04E+06
Bahamas	33	277	15	4.65E+06	21	6.51E+06
Barbados	132	138	15	4.05E+06	21	5.67E+06
British Virgin Islands	8	13	15	3.15E+05	21	4.41E+05
Cayman Islands	0	39	15	5.85E+05	21	8.19E+05
Dominica	22	56	15	1.17E+06	21	1.64E+06
Grenada	48	32	15	1.20E+06	21	1.68E+06
Guadeloupe	3	433	15	6.54E+06	21	9.16E+06
Jamaica	1258	1369	15	3.94E+07	21	5.52E+07
Martinique	18	372	15	5.85E+06	21	8.19E+06
Montserrat	3	0	15	4.50E+04	21	6.30E+04
Netherlands Antilles	67	152	15	3.29E+06	21	4.60E+06
Puerto Rico	125	3735	15	5.79E+07	21	8.11E+07
Saint Kitts and Nevis	28	14	15	6.30E+05	21	8.82E+05
Saint Lucia	104	44	15	2.22E+06	21	3.11E+06
Saint Vincent/Grenadines	51	68	15	1.79E+06	21	2.50E+06
Trinidad and Tobago	324	974	15	1.95E+07	21	2.73E+07
Turks and Caicos Is	11	9	15	3.00E+05	21	4.20E+05
US Virgin Islands	7	103	15	1.65E+06	21	2.31E+06
Total				1.54E+08		2.15E+08

Table 4.1NAEUC: Mean Annual Flows (MAF) and Standard Deviation (SD), km3/year, North America/Europe

	2000 MAF	2000 SD	B1 2050 MAF	B1 2050 SD	A1b 2050 MAF	A1b 2050 SD
Canada	2850	78.65	3017.81	131.38	3089.35	118.11
United States of America	2800	201.65	2814.79	293.53	2789.58	323.67
Austria	18	2.00	15.00	2.02	14.00	2.38
Belarus	24	4.89	20.00	4.77	21.00	4.22
Bulgaria	21	4.69	16.42	5.20	15.34	4.30
Czech Republic	13.15	1.89	12.06	1.97	12.55	3.08
Denmark	6	0.71	6.28	1.04	6.57	0.94
Estonia	12.71	2.19	11.45	2.49	12.06	2.46
France	178.5	19.26	169.75	25.64	161.43	20.39
Germany	107	9.29	102.81	19.45	108.40	14.70
Greece	58	14.92	42.63	15.64	38.66	12.19
Hungary	23	3.64	22.00	4.30	22.50	5.09
Iceland	170	15.52	168.45	15.64	177.03	15.63
Ireland	49	4.17	50.42	7.23	50.06	7.57
Italy	182.5	22.27	172.65	27.44	162.45	30.06
Latvia	16.74	2.47	15.44	3.30	15.44	3.30
Lithuania	15.56	2.23	13.87	2.99	14.09	3.01
Moldova, Republic of	1	0.25	0.85	0.19	0.72	0.20
Netherlands	11	1.34	10.86	2.51	11.44	1.92
Norway	382	21.70	403.93	32.81	403.93	32.81
Poland	53.6	7.17	50.28	9.47	53.89	10.71
Portugal	38	15.65	33.62	22.59	18.82	20.20
Romania	62	11.30	57.00	11.83	55.00	12.43
Russian Federation	4298	144.06	4660.00	260.14	4810.00	229.68
Spain	111.2	30.39	96.00	31.32	70.85	24.12
Sweden	171	10.19	181.15	13.06	185.82	15.76
Switzerland	40.4	3.83	38.61	5.89	37.36	4.99
Ukraine	81	12.84	76.00	16.74	74.00	10.99
United Kingdom	145	12.04	145.94	18.75	144.07	19.42

Table 4.2 NAEUC: Water Withdrawals (km3/year), North America/Europe

	2000	SRES B1 2050	SRES A1b 2050
Canada	45.97	48.15	71.94
United States of America	479.35	572.38	721.26
Austria	2.11	2.11	3.19
Belarus	2.79	3.38	4.74
Bulgaria	10.5	13.62	14.45
Czech Republic	2.58	2.73	2.76
Denmark	1.27	0.73	1.49
Estonia	0.158	0.66	0.66
France	39.96	40.72	65.13
Germany	47.05	48.15	76.00
Greece	7.77	8.53	10.54
Hungary	7.64	8.05	8.78
Iceland	0.15	0.15	0.23
Ireland	1.13	1.13	1.82
Italy	44.37	46.60	65.27
Latvia	0.30	0.41	0.43
Lithuania	0.27	0.44	0.45
Moldova, Republic of	2.31	3.70	3.96
Netherlands	7.94	8.53	13.05
Norway	2.19	2.22	3.44
Poland	16.20	18.23	18.80
Portugal	11.26	12.06	15.89
Romania	23.18	43.01	48.56
Russian Federation	76.68	98.29	104.02
Spain	35.63	38.94	51.11
Sweden	2.96	3.02	4.37
Switzerland	2.57	2.58	4.09
Ukraine	37.53	67.37	75.64
United Kingdom	9.54	9.58	9.66

Table 4.3 NAEUC: Incremental Sources and Total Capital Costs, Scenario B1, North America/Europe

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Canada	0.00	0.00	0	0	0	0	0.00E+00
United States of America	0.00	21.31			0		5.84E+09
Austria	0.00	0.00			0		5.68E+05
Belarus	0.00	0.25			0		6.91E+07
Bulgaria	80.71	0.00	7	0	0	0	6.37E+09
Czech Republic	0.00	0.03			0		8.16E+06
Denmark	0.00	0.00	0	0	0	0	0.00E+00
Estonia	0.00	0.04			0		1.08E+07
France	52.59	0.11			0		5.72E+07
Germany	1470.06	0.17	7	0	0	0	7.10E+09
Greece	0.00	0.20	0	0	0	0	5.39E+07
Hungary	207.42	0.05	0	0	0	0	1.17E+08
Iceland	0.00	0.00	0	0	0	0	1.65E+05
Ireland	0.00	0.00			0		1.83E+05
Italy	85.96	0.70	0	0	0	0	2.34E+08
Latvia	0.00	0.00			0		3.59E+05
Lithuania	0.00	0.12	0	0	0	0	3.42E+07
Moldova, Republic of	0	0			0		0.00E+00
Netherlands	72.24	0.08	4	0	0	0	3.67E+09
Norway	0.00	0.00			0		1.31E+06
Poland	538.01	0.25	0	0	0	0	3.35E+08
Portugal	1803.26	0.22	0	0	0	0	9.53E+08
Romania	771.25	0.00			18		3.82E+08
Russian Federation	0.00	1.38	0	0	0	0	3.79E+08
Spain	2414.11	0.50			0		1.33E+09
Sweden	0.00	0.01	0	0	0	0	3.52E+06
Switzerland	0.00	0.00			0		6.79E+05
Ukraine	1430.34	0.00	10	0	22	16	9.75E+09
United Kingdom	0.00	0.01	0	0	0	0	2.93E+06
Total	8925.94	25.46	28.00	0.00	40.00	16.00	3.67E+10

Table 4.4 NAEUC: Incremental Sources and Total Capital Costs, Scenario A1b, North America/Europe

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Canada	0	0.56	0	0	0	0	1.55E+08
United States of America	3878.04	55.41			0		1.71E+10
Austria	1.75	0.71			0		1.97E+08
Belarus	13.43	0.84			0		2.37E+08
Bulgaria	36.59	0.00	8	0	0	0	7.25E+09
Czech Republic	8.03	0.03			0		1.35E+07
Denmark	0.00	0.15	0	0	0	0	4.23E+07
Estonia	0.00	0.04			0		1.09E+07
France	1456.99	3.78			0		1.76E+09
Germany	497.46	4.37	33	0	0	0	3.13E+10
Greece	158.35	0.71	0	0	0	0	2.74E+08
Hungary	431.76	0.15	0	0	0	0	2.55E+08
Iceland	0.00	0.05	0	0	0	0	1.46E+07
Ireland	0.00	0.12			0		3.34E+07
Italy	1772.26	6.55	0	0	0	0	2.67E+09
Latvia	0.00	0.00			0		4.14E+05
Lithuania	0.00	0.13	0	0	0	0	3.59E+07
Moldova, Republic of	0.00	0.00			0		0.00E+00
Netherlands	0.00	0.60	8	0	0	0	7.40E+09
Norway	0.00	0.23			0		6.24E+07
Poland	584.47	0.32	0	0	0	0	3.77E+08
Portugal	3190.95	0.00	2.5	0	6.5	6	3.84E+09
Romania	842.46	0.00			17		4.17E+08
Russian Federation	0.00	1.75	0	0	0	0	4.79E+08
Spain	1185.13	0.00			19		5.87E+08
Sweden	0.00	0.29	0	0	0	0	7.85E+07
Switzerland	0.00	0.53			0		1.46E+08
Ukraine	601.83	0.00	10	0	21	36	9.34E+09
United Kingdom	0.00	0.03	0	0	0	0	8.76E+06
Total	14659.50	77.38	61.50	0.00	63.50	42.00	8.41E+10

Table 4.5 NAEUC: Approximated Incremental Total Capital Costs for Nations Lacking Data, North America/Europe (0 means insufficient data)

	Rural population (1000 inhab)	Urban population (1000 inhab)	B1 Cost/person	B1 Total Cost $	A1b Cost/person	A1b Total Cost $
Albania	1797	1344	12	3.77E+07	25	7.85E+07
Andorra	6	63		0.00E+00		0.00E+00
Belgium	291	10005	1	1.03E+07	29	2.99E+08
Belgium-Luxembourg	328	10415	1	1.07E+07	29	3.12E+08
Bosnia and Herzegovina	2305	1822	12	4.95E+07	25	1.03E+08
Channel Islands				0.00E+00		0.00E+00
Croatia	1850	2588	12	5.33E+07	25	1.11E+08
Slovakia			12	0.00E+00	25	0.00E+00
Faeroe Islands	29	18		0.00E+00		0.00E+00
Finland	2030	3167	0.4	2.08E+06	8.5	4.42E+07
Gibraltar	0	27		0.00E+00		0.00E+00
Holy See	0	1		0.00E+00		0.00E+00
Liechtenstein	26	7		0.00E+00		0.00E+00
Luxembourg	37	410	1	4.47E+05	29	1.30E+07
Macedonia,The Fmr Yug Rp	833	1212	12	2.45E+07	25	5.11E+07
Malta	33	359		0.00E+00		0.00E+00
Monaco	0	34		0.00E+00		0.00E+00
San Marino	3	24		0.00E+00		0.00E+00
Serbia and Montenegro	5090	5446	12	1.26E+08	25	2.63E+08
Slovakia	2324	3074	12	6.48E+07	25	1.35E+08
Slovenia	978	1008	12	2.38E+07	25	4.97E+07
Svalbard and Jan Mayen				0.00E+00		0.00E+00
Yugoslavia SFR				0.00E+00		0.00E+00
Bermuda				0.00E+00		0.00E+00
Greenland				0.00E+00		0.00E+00
Saint Pierre & Miquelon				0.00E+00		0.00E+00
Total				4.04E+08		1.46E+09

Table 4.6 Oceania (developing) – All Lacking Sufficient Data

	Rural population (1000 inhab)	Urban population (1000 inhab)
American Samoa	6	
Canton and Enderbury Is		
Christmas Island		
Cocos (Keeling) Islands		
Cook Islands	6	12
Fiji Islands	406	424
French Polynesia	115	126
Guam	11	150
Johnston Island		
Kiribati	47	40
Marshall Islands	18	34
Micronesia,Fed States of	77	31
Midway Islands		
Nauru	0	13
New Caledonia	87	137
Niue	1	1
Norfolk Island		
Northern Mariana Is	5	71
Pacific Islands Trust Tr		
Palau	6	14
Papua New Guinea	4 848	739
Pitcairn Islands		
Samoa	137	39
Solomon Islands	388	75
Tokelau	2	0
Tonga	69	34
Tuvalu	5	6
US Minor Outlying Is		
Vanuatu	160	47
Wake Island		
Wallis and Futuna Is	15	0

Table 4.1ANZ: Mean Annual Flows (MAF) and Standard Deviation (SD), km3/year, ANZ

	2000 MAF	2000 SD	B1 2050 MAF	B1 2050 SD	A1b 2050 MAF	A1b 2050 SD
Australia	492	72.03	535.65	134.25	528.87	130.44
New Zealand	327	29.00	339.27	29.98	329.69	33.71

Table 4.2ANZ: Water Withdrawals (km3/year), ANZ

	2000	SRES B1 2050	SRES A1b 2050
Australia	23.93	23.72	35.42
New Zealand	2.11	2.36	3.01

Table 4.3ANZ: Incremental Sources and Total Capital Costs, Scenario B1, ANZ

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Australia	0	0	0	0	0	0	0
New Zealand	0	0.050	0	0	0	0	1.38E+07
Total	0	0.0502245	0	0	0	0	1.38E+07

Table 4.4ANZ: Incremental Sources and Total Capital Costs, Scenario A1b, ANZ

	Additional Reservoir storage (10^6 m3)	Additional Wells (km3/yr)	Reclaimed Wastewater (km3/year)	desalination (km3/year)	Improved Irrigation (km3/year)	Unmet Irrigation (km3/year)	Total Cost ($)
Australia	0	1.06	0	0	0	0	2.90E+08
New Zealand	0	0.18	0	0	0	0	4.92E+07
Total	0	1.24	0	0	0	0	3.39E+08

Table 5.1: Summary

	2000 MAF km3	B1 MAF Km3	A1B MAF Km3	A1B/B1 Variance	2000 Demand km3	B1 Demand Km3	A1B Demand Km3	B1 Cost ($)	A1B Cost ($)
West Africa	1053.84	1106.43	1210.45	>1	25.84	97.29	105.711	5.24E+09	6.75E+09
Estimated W Africa								2.39E+06	4.59E+06
North, East, Central, South Africa	2864.73	2936.81	2912.30	>1	186.42	523.169	587.58	1.26E+11	1.31E+11
Estimated North, East, Central, South Africa								7.78E+06	1.69E+07
Asia	10670.5	11373.8	11706.9	>1	2314.51	3510.68	3944.17	2.27E+11	2.70E+11
Estimated Asia								1.31E+10	1.78E+10
S America	12246.0	12146.8	12461.5	>1	164.61	540.61	533.88	1.14E+10	1.12E+10
Estimated S America (insufficient data)									
Caribbean	1169.50	1017.96	1062.26	>1	99.90	261.65	257.15	5.42E+09	8.56E+09
Estimated Caribbean								1.54E+08	2.15E+08
N American/Europe	11939.36	12426.05	12576.41	~1	921.35	1105.48	1401.72	3.67E+10	8.41E+10
Estimated N American/Europe								4.04E+08	1.46E+09
Oceania (developing) – All Lacking Sufficient Data									
Australia/New Zealand	819.00	874.92	858.55	~1	26.04	26.08	38.43	1.38E+07	3.39E+08
Total								4.25E+11	5.31E+11

Table 5.2: ODA Assistance, Millions US$

Countries	2005 Multilateral	2005 Bilateral	2000 Bilateral	2000 Multilateral
Afghanistan	1.12E+00	1.59E+01	1.64E+00	1.17E+00
Albania	1.75E+01	2.21E+01	5.19E+01	1.00E+01
Algeria	2.49E+01	1.01E+01	1.08E-01	8.85E+01
American Samoa	NA!	NA!	NA!	NA!
Andorra	NA!	NA!	NA!	NA!
Angola	3.90E-02	2.44E+00	0.00E+00	7.66E+00
Antigua and Barbuda	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Argentina	0.00E+00	8.55E-02	3.91E-02	0.00E+00
Armenia	2.00E+01	6.73E-01	2.36E+00	0.00E+00
Aruba	NA!	NA!	NA!	NA!
Australia	NA!	NA!	NA!	NA!
Austria	NA!	NA!	NA!	NA!
Azerbaijan	2.43E+01	1.28E+01	1.39E+01	0.00E+00
Bahamas, The	NA!	NA!	NA!	NA!
Bahrain	#N/A	0.00E+00	0.00E+00	#N/A
Bangladesh	9.79E-01	1.38E+02	6.38E+01	2.36E+00
Barbados	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Belarus	0.00E+00	0.00E+00	#N/A	#N/A
Belgium	NA!	NA!	NA!	NA!
Belize	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benin	6.30E+01	3.05E+01	2.03E+01	3.27E-01
Bermuda	NA!	NA!	NA!	NA!
Bhutan	0.00E+00	7.58E-01	0.00E+00	1.57E-01
Bolivia	1.71E+01	2.16E+00	1.41E+01	4.00E+01
Bosnia and Herzegovina	0.00E+00	1.01E+01	1.52E+00	1.20E+01
Botswana	0.00E+00	1.61E-02	0.00E+00	0.00E+00
Brazil	5.76E+01	2.00E+01	8.45E-01	2.30E+02
Brunei	NA!	NA!	NA!	NA!
Bulgaria	NA!	NA!	NA!	NA!
Burkina Faso	2.26E+00	2.30E+01	9.37E-01	2.97E+01
Burundi	6.18E-02	2.61E+01	1.67E-01	2.71E-01
Cambodia	0.00E+00	6.96E+00	6.12E-01	0.00E+00
Cameroon	0.00E+00	1.57E+00	3.60E+00	0.00E+00
Canada	NA!	NA!	NA!	NA!
Cape Verde	0.00E+00	2.31E+00	3.12E-01	1.97E-01
Cayman Islands	NA!	NA!	NA!	NA!
Central African Republic	0.00E+00	0.00E+00	1.62E-02	1.49E-01
Chad	3.73E+01	1.56E+01	2.21E+01	6.54E-01
Channel Islands	NA!	NA!	NA!	NA!
Chile	0.00E+00	3.89E-02	1.27E-02	2.40E-01
China	4.90E+02	3.68E+02	5.87E+02	2.01E+02
Chinese Taipei	NA!	NA!	NA!	NA!
Colombia	7.21E+01	3.78E-01	1.44E-01	3.86E+01
Comoros	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Congo, Dem. Rep.	4.71E-02	1.36E+01	9.27E-01	#N/A
Congo, Rep.	0.00E+00	0.00E+00	2.96E-01	6.63E-02
Costa Rica	0.00E+00	4.24E-01	2.15E-01	0.00E+00

Cote d'Ivoire	0.00E+00	4.81E-02	4.39E-01	2.92E-01
Croatia	1.53E+01	1.08E+00	2.27E-01	0.00E+00
Cuba	0.00E+00	8.26E-01	2.03E-01	1.80E-01
Cyprus	NA!	NA!	NA!	NA!
Czech Republic	NA!	NA!	NA!	NA!
Denmark	NA!	NA!	NA!	NA!
Djibouti	0.00E+00	0.00E+00	0.00E+00	1.22E+00
Dominica	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dominican Republic	0.00E+00	8.46E-01	3.17E+00	2.51E+01
Ecuador	0.00E+00	1.22E+01	3.72E+01	3.25E+01
Egypt, Arab Rep.	9.94E+01	9.30E+00	3.76E+01	3.82E-01
El Salvador	0.00E+00	6.59E+00	1.93E+00	4.37E+01
Equatorial Guinea	0.00E+00	1.84E-01	1.80E-02	4.36E-02
Eritrea	2.84E-01	1.33E+00	2.78E-01	5.67E-02
Estonia	NA!	NA!	NA!	NA!
Ethiopia	3.22E+00	1.44E+01	4.73E+00	8.94E-01
Faeroe Islands	NA!	NA!	NA!	NA!
Fiji	4.70E+01	3.40E-02	3.21E-01	0.00E+00
Finland	NA!	NA!	NA!	NA!
France	NA!	NA!	NA!	NA!
French Polynesia	NA!	NA!	NA!	NA!
Gabon	0.00E+00	7.68E-03	0.00E+00	#N/A
Gambia, The	8.45E+00	2.36E+00	1.25E-02	#N/A
Georgia	0.00E+00	1.62E-01	4.15E-01	0.00E+00
Germany	NA!	NA!	NA!	NA!
Ghana	2.86E+01	5.53E+00	1.90E+01	1.55E+01
Gibraltar	NA!	NA!	NA!	NA!
Greece	NA!	NA!	NA!	NA!
Greenland	NA!	NA!	NA!	NA!
Grenada	0.00E+00	0.00E+00	2.49E+00	6.45E-02
Guam	NA!	NA!	NA!	NA!
Guatemala	0.00E+00	1.83E+01	1.62E+01	5.05E-02
Guinea	1.04E-01	2.21E+01	8.15E+00	5.03E-01
Guinea-Bissau	0.00E+00	2.31E-02	0.00E+00	3.16E-01
Guyana	1.13E+01	1.16E-01	2.89E+01	2.96E-02
Haiti	0.00E+00	1.62E+00	4.19E-01	0.00E+00
Honduras	1.50E+01	7.23E+00	3.39E+01	2.60E+01
Hong Kong, Ch ina	NA!	NA!	NA!	NA!
Hungary	NA!	NA!	NA!	NA!
Iceland	NA!	NA!	NA!	NA!
India	3.83E+00	5.37E+02	3.51E+01	7.13E+01
Indonesia	5.25E+01	1.65E+02	6.64E+00	4.33E+00
Iran, Islamic Rep.	2.24E+02	2.26E+00	0.00E+00	1.45E+02
Iraq	0.00E+00	7.42E+02	8.36E-01	2.78E-01
Ireland	NA!	NA!	NA!	NA!
Isle of Man	NA!	NA!	NA!	NA!
Israel	NA!	NA!	NA!	NA!
Italy	NA!	NA!	NA!	NA!
Jamaica	1.82E+01	5.56E-01	3.10E-01	9.35E+00
Japan	NA!	NA!	NA!	NA!

Jordan	0.00E+00	1.29E+02	9.22E+01	1.86E+00
Kazakhstan	3.96E+01	5.50E-01	4.72E+00	0.00E+00
Kenya	2.20E-01	4.48E+01	1.30E+01	5.46E-01
Kiribati	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Korea, Dem. Rep.	4.78E-01	0.00E+00	0.00E+00	1.73E-01
Korea, Rep.	NA!	NA!	NA!	NA!
Kuwait	NA!	NA!	NA!	NA!
Kyrgyz Republic	0.00E+00	1.27E-01	2.37E-01	0.00E+00
Lao PDR	6.61E-02	1.13E+01	7.06E+00	1.94E+01
Latvia	NA!	NA!	NA!	NA!
Lebanon	6.21E+00	8.55E+01	1.03E+00	7.82E-02
Lesotho	4.44E+01	3.05E+00	3.06E+00	4.61E-02
Liberia	2.86E-01	1.36E-01	0.00E+00	3.57E-02
Libya	0.00E+00	0.00E+00	#N/A	0.00E+00
Liechtenstein	NA!	NA!	NA!	NA!
Lithuania	NA!	NA!	NA!	NA!
Luxembourg	NA!	NA!	NA!	NA!
Macao, China	NA!	NA!	NA!	NA!
Macedonia, FYR	0.00E+00	5.99E+00	2.35E+01	#N/A
Madagascar	8.00E+00	9.84E-02	7.30E+00	6.46E-01
Malawi	1.49E-01	3.89E+00	8.17E+00	2.15E-01
Malaysia	0.00E+00	7.45E+02	4.50E+02	0.00E+00
Maldives	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mali	2.51E+01	1.53E+01	6.64E+00	6.91E-01
Malta	NA!	NA!	NA!	NA!
Marshall Islands	0.00E+00	3.55E-03	0.00E+00	#N/A
Mauritania	0.00E+00	3.80E+00	0.00E+00	2.52E-01
Mauritius	0.00E+00	2.50E-02	8.03E-01	3.79E+00
Mayotte	#N/A	0.00E+00	2.81E-01	#N/A
Mexico	1.85E+02	6.82E+01	2.06E+02	0.00E+00
Micronesia, Fed. Sts.	0.00E+00	0.00E+00	0.00E+00	#N/A
Moldova	0.00E+00	4.02E-01	2.19E-01	0.00E+00
Monaco	NA!	NA!	NA!	NA!
Mongolia	0.00E+00	9.53E-01	1.25E-01	0.00E+00
Morocco	1.44E+02	5.35E+01	1.68E+02	1.03E-01
Mozambique	4.21E+01	1.99E+01	1.32E+01	2.37E+01
Myanmar	5.72E-01	4.54E-01	0.00E+00	1.06E+00
Namibia	0.00E+00	4.08E+00	9.79E-01	6.74E-01
Naurou	0.00E+00	2.35E-01	0.00E+00	#N/A
Nepal	1.50E+01	1.36E+01	6.23E+00	3.55E+01
Netherlands	NA!	NA!	NA!	NA!
Netherlands Antilles	NA!	NA!	NA!	NA!
New Caledonia	NA!	NA!	NA!	NA!
New Zealand	NA!	NA!	NA!	NA!
Nicaragua	0.00E+00	7.81E+00	2.02E+01	2.90E+01
Niger	1.37E+01	1.05E+01	1.38E+01	5.41E-03
Nigeria	2.02E+02	4.08E+00	1.47E+01	2.09E+01
Northern Mariana Islands	NA!	NA!	NA!	NA!
Norway	NA!	NA!	NA!	NA!
Oman	0.00E+00	3.60E-02	0.00E+00	0.00E+00

Pakistan	0.00E+00	4.77E+01	1.20E+00	1.70E+00
Palau	0.00E+00	0.00E+00	0.00E+00	#N/A
Panama	1.99E+01	3.44E-02	1.00E+00	0.00E+00
Papua New Guinea	1.42E+01	1.30E-01	5.95E+00	0.00E+00
Paraguay	0.00E+00	7.91E-02	1.16E-01	1.92E-02
Peru	0.00E+00	1.08E+01	3.35E+02	2.83E-01
Philippines	6.40E+01	1.24E+01	1.14E+01	1.75E+02
Poland	NA!	NA!	NA!	NA!
Portugal	NA!	NA!	NA!	NA!
Puerto Rico	NA!	NA!	NA!	NA!
Qatar	NA!	NA!	NA!	NA!
Romania	NA!	NA!	NA!	NA!
Russian Federation	NA!	NA!	NA!	NA!
Rwanda	4.97E+00	7.16E-01	5.61E+00	6.69E-01
Samoa	3.18E+01	0.00E+00	1.16E-01	0.00E+00
San Marino	NA!	NA!	NA!	NA!
Sao Tome and Principe	0.00E+00	1.75E-01	0.00E+00	2.57E+00
Saudi Arabia	#N/A	4.05E-02	2.35E-02	#N/A
Senegal	5.18E+01	1.15E+01	7.46E+00	1.94E-01
Serbia and Montenegro	3.73E+00	3.86E+01	2.74E+01	6.45E+00
Seychelles	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sierra Leone	3.87E+00	1.17E+00	2.60E+00	1.65E-01
Singapore	NA!	NA!	NA!	NA!
Slovak Republic	NA!	NA!	NA!	NA!
Slovenia	NA!	NA!	NA!	NA!
Solomon Islands	0.00E+00	8.83E-01	9.03E-01	1.38E-01
Somalia	3.84E-01	3.09E-01	1.14E+00	7.42E-01
South Africa	1.24E+01	4.07E+00	5.28E+00	8.85E-02
Spain	NA!	NA!	NA!	NA!
Sri Lanka	0.00E+00	1.20E+02	3.13E+00	1.97E+01
St. Kitts and Nevis	#N/A	0.00E+00	0.00E+00	#N/A
St. Lucia	1.16E+01	0.00E+00	3.17E-01	0.00E+00
St. Vincent and the Grenadines	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sudan	1.01E+00	1.77E+01	1.49E+00	8.05E-01
Suriname	0.00E+00	0.00E+00	1.51E-01	0.00E+00
Swaziland	0.00E+00	2.74E-01	1.85E-02	3.22E-02
Sweden	NA!	NA!	NA!	NA!
Switzerland	NA!	NA!	NA!	NA!
Syrian Arab Republic	6.21E+00	1.81E+01	1.64E+01	0.00E+00
Tajikistan	2.11E-01	1.65E+00	0.00E+00	3.99E-02
Tanzania	4.77E+01	3.62E+01	1.78E+01	5.85E+00
Thailand	0.00E+00	1.41E+00	8.91E+01	0.00E+00
Timor-Leste	0.00E+00	1.13E+01	1.78E+00	8.21E-02
Togo	0.00E+00	1.34E-01	1.65E-01	1.05E-01
Tonga	0.00E+00	1.89E+00	1.17E+01	0.00E+00
Trinidad and Tobago	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tunisia	5.05E+01	3.79E+01	5.65E+01	4.19E+00
Turkey	2.79E+02	1.96E-01	5.08E-01	3.44E+01
Turkmenistan	0.00E+00	0.00E+00	0.00E+00	1.59E-02
Tuvalu	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Uganda	2.77E+01	1.77E+01	4.95E+00	2.11E+01
Ukraine	1.86E+01	6.21E-01	0.00E+00	#N/A
United Arab Emirates	NA!	NA!	NA!	NA!
United Kingdom	NA!	NA!	NA!	NA!
United States	NA!	NA!	NA!	NA!
Uruguay	0.00E+00	4.33E-02	1.29E+00	2.70E+01
Uzbekistan	0.00E+00	9.39E+00	0.00E+00	0.00E+00
Vanuatu	0.00E+00	2.43E-01	1.31E+00	0.00E+00
Venezuela, RB	0.00E+00	4.87E-01	8.32E+01	0.00E+00
Vietnam	2.22E+02	6.25E+01	1.65E+01	1.62E+00
Virgin Islands (U.S.)	NA!	NA!	NA!	NA!
West Bank and Gaza	NA!	NA!	NA!	NA!
Yemen, Rep.	#N/A	2.53E+01	#N/A	#N/A
Zambia	6.32E-01	4.99E+01	8.04E+00	5.50E+01
Zimbabwe	0.00E+00	8.21E-01	1.90E+00	9.01E-02
Anguilla	#N/A	0.00E+00	7.57E-02	#N/A
Cook islands	0.00E+00	0.00E+00	1.75E-01	#N/A
Montserrat	#N/A	0.00E+00	3.57E-01	#N/A
Niue	0.00E+00	1.95E-01	0.00E+00	#N/A
Palestinian	0.00E+00	1.16E+02	7.59E+01	1.35E+01
St. Helena	#N/A	0.00E+00	1.74E+00	#N/A
Tokelau	#N/A	0.00E+00	#N/A	#N/A
Turks & Caiocos Islands	#N/A	0.00E+00	3.03E-02	#N/A
Wallis & Futuna	7.01E-01	0.00E+00	#N/A	7.29E+00
Total	2.96E+03	4.17E+03	2.89E+03	1.56E+03