Country Overview - Gambia

Water Indicators

Indicator	Value	Description	Source
Overall Basin Risk (score)	2.55	Overall Basin Risk (score)	
Overall Basin Risk (rank)	119	Overall Basin Risk (rank)	
Physical risk (score)	2.30	Physical risk (score)	
Physical risk (rank)	139	Physical risk (rank)	
Regulatory risk (score)	3.71	Regulatory risk (score)	
Regulatory risk (rank)	17	Regulatory risk (rank)	
Reputation risk (score)	2.16	Reputation risk (score)	
Reputation risk (rank)	172	Reputation risk (rank)	
1. Quantity - Scarcity (score)	2.33	1. Quantity - Scarcity (score)	
1. Quantity - Scarcity (rank)	88	1. Quantity - Scarcity (rank)	
2. Quantity - Flooding (score)	2.51	2. Quantity - Flooding (score)	
2. Quantity - Flooding (rank)	140	2. Quantity - Flooding (rank)	
3. Quality (score)	2.76	3. Quality (score)	
3. Quality (rank)	120	3. Quality (rank)	
4. Ecosystem Service Status (score)	1.31	4. Ecosystem Service Status (score)	
4. Ecosystem Service Status (rank)	181	4. Ecosystem Service Status (rank)	
5. Enabling Environment (Policy & Laws) (score)	3.90	5. Enabling Environment (Policy & Laws) (score)	
5. Enabling Environment (Policy & Laws) (rank)	18	5. Enabling Environment (Policy & Laws) (rank)	
6. Institutions and Governance (score)	3.75	6. Institutions and Governance (score)	
6. Institutions and Governance (rank)	43	6. Institutions and Governance (rank)	
7. Management Instruments (score)	3.01	7. Management Instruments (score)	
7. Management Instruments (rank)	78	7. Management Instruments (rank)	
8 - Infrastructure & Finance (score)	4.45	8 - Infrastructure & Finance (score)	
8 - Infrastructure & Finance (rank)	28	8 - Infrastructure & Finance (rank)	
9. Cultural Diversity (score)	1.00	9. Cultural importance (score)	
9. Cultural Diversity (rank)	168	9. Cultural importance (rank)	
10. Biodiversity Importance (score)	3.50	10. Biodiversity importance (score)	

Indicator	Value	Description	Source
10. Biodiversity Importance (rank)	94	10. Biodiversity importance (rank)	
11. Media Scrutiny (score)	2.55	11. Media Scrutiny (score)	
11. Media Scrutiny (rank)	126	11. Media Scrutiny (rank)	
12. Conflict (score)	1.72	12. Conflict (score)	
12. Conflict (rank)	176	12. Conflict (rank)	
1.0 - Aridity (score)	3.00	The aridity risk indicator is based on the Global Aridity Index (Global-Aridity) and Global Potential Evapo-Transpiration (Global-PET) Geospatial data sets by Trabucco and Zomer (2009). These data sets provide information about the potential availability of water in regions with low water demand, thus they are used in the Water Risk Filter 5.0 to better account for deserts and other arid areas in the risk assessment.	Trabucco, A., & Zomer, R. J. (2009). Global potential evapo-transpiration (Global-PET) and global aridity index (Global-Aridity) geo-database. CGIAR consortium for spatial information.
1.0 - Aridity (rank)	40	The aridity risk indicator is based on the Global Aridity Index (Global-Aridity) and Global Potential Evapo-Transpiration (Global-PET) Geospatial data sets by Trabucco and Zomer (2009). These data sets provide information about the potential availability of water in regions with low water demand, thus they are used in the Water Risk Filter 5.0 to better account for deserts and other arid areas in the risk assessment.	Trabucco, A., & Zomer, R. J. (2009). Global potential evapo-transpiration (Global-PET) and global aridity index (Global-Aridity) geo-database. CGIAR consortium for spatial information.
1.1 - Water Depletion (score)	1.79	The water depletion risk indicator is based on annual average monthly net water depletion from Brauman et al. (2016). Their analysis is based on model outputs from the newest version of the integrated water resources model WaterGAP3 which measures water depletion as the ratio of water consumption-to-availability.	Brauman, K. A., Richter, B. D., Postel, S., Malsy, M., & Flörke, M. (2016). Water depletion: An improved metric for incorporating seasonal and dry-year water scarcity into water risk assessments. Elem Sci Anth, 4.
1.1 - Water Depletion (rank)	92	The water depletion risk indicator is based on annual average monthly net water depletion from Brauman et al. (2016). Their analysis is based on model outputs from the newest version of the integrated water resources model WaterGAP3 which measures water depletion as the ratio of water consumption-to-availability.	Brauman, K. A., Richter, B. D., Postel, S., Malsy, M., & Flörke, M. (2016). Water depletion: An improved metric for incorporating seasonal and dry-year water scarcity into water risk assessments. Elem Sci Anth, 4.
1.2 - Baseline Water Stress (score)	1.07	World Resources Institute's Baseline Water Stress measures the ratio of total annual water withdrawals to total available annual renewable supply, accounting for upstream consumptive use. A higher percentage indicates more competition among users.	Hofste, R., Kuzma, S., Walker, S., ... & Sutanudjaja, E.H. (2019). Aqueduct 3.0: Updated decision relevant global water risk indicators. Technical note. Washington, DC: World Resources Institute.

Indicator	Value	Description	Source
1.2 - Baseline Water Stress (rank)	146	World Resources Institute's Baseline Water Stress measures the ratio of total annual water withdrawals to total available annual renewable supply, accounting for upstream consumptive use. A higher percentage indicates more competition among users.	Hofste, R., Kuzma, S., Walker, S., ... & Sutanudjaja, E.H. (2019). Aqueduct 3.0: Updated decision relevant global water risk indicators. Technical note. Washington, DC: World Resources Institute.
1.3 - Blue Water Scarcity (score)	4.00	The blue water scarcity risk indicator is based on Mekonnen and Hoekstra (2016) global assessment of blue water scarcity on a monthly basis and at high spatial resolution (grid cells of 30 × 30 arc min resolution). Blue water scarcity is calculated as the ratio of the blue water footprint in a grid cell to the total blue water availability in the cell. The time period analyzed in this study ranges from 1996 to 2005.	Mekonnen, M. M., & Hoekstra, A. Y. (2016). Four billion people facing severe water scarcity. Science advances, 2(2), e1500323.
1.3 - Blue Water Scarcity (rank)	39	The blue water scarcity risk indicator is based on Mekonnen and Hoekstra (2016) global assessment of blue water scarcity on a monthly basis and at high spatial resolution (grid cells of 30 × 30 arc min resolution). Blue water scarcity is calculated as the ratio of the blue water footprint in a grid cell to the total blue water availability in the cell. The time period analyzed in this study ranges from 1996 to 2005.	Mekonnen, M. M., & Hoekstra, A. Y. (2016). Four billion people facing severe water scarcity. Science advances, 2(2), e1500323.
1.4 - Projected Change in Water Discharge (by ~2050) (score)	1.00	This risk indicator is based on multi-model simulation that applies both global climate and hydrological models from the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP). To estimate the change at 2°C of global warming above 1980-2010 levels, simulated annual water discharge was averaged over a 31-year period with 2°C mean warming. Results are expressed in terms of relative change (%) in probability between present day (1980-2010) conditions and 2°C scenarios by 2050.	Schewe, J., Heinke, J., Gerten, D., Haddeland, I., Arnell, N. W., Clark, D. B., ... & Gosling, S. N. (2014). Multimodel assessment of water scarcity under climate change. Proceedings of the National Academy of Sciences, 111(9), 3245-3250.
1.4 - Projected Change in Water Discharge (by ~2050) (rank)	179	This risk indicator is based on multi-model simulation that applies both global climate and hydrological models from the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP). To estimate the change at 2°C of global warming above 1980-2010 levels, simulated annual water discharge was averaged over a 31-year period with 2°C mean warming. Results are expressed in terms of relative change (%) in probability between present day (1980-2010) conditions and 2°C scenarios by 2050.	Schewe, J., Heinke, J., Gerten, D., Haddeland, I., Arnell, N. W., Clark, D. B., ... & Gosling, S. N. (2014). Multimodel assessment of water scarcity under climate change. Proceedings of the National Academy of Sciences, 111(9), 3245-3250.

Indicator	Value	Description	Source
1.5 - Drought Frequency Probability (score)	2.31	This risk indicator is based on the Standardized Precipitation and Evaporation Index (SPEI). Vicente-Serrano et al. (2010) developed this multi-scalar drought index applying both precipitation and temperature data to detect, monitor and analyze different drought types and impacts in the context of global warming. The mathematical calculations used for SPEI are similar to the Standard Precipitation Index (SPI), but it has the advantage to include the role of evapotranspiration.	Vicente-Serrano, S. M., Beguería, S., & López-Moreno, J. I. (2010). A multiscalar drought index sensitive to global warming: the standardized precipitation evapotranspiration index. Journal of climate, 23(7), 1696-1718.
1.5 - Drought Frequency Probability (rank)	106	This risk indicator is based on the Standardized Precipitation and Evaporation Index (SPEI). Vicente-Serrano et al. (2010) developed this multi-scalar drought index applying both precipitation and temperature data to detect, monitor and analyze different drought types and impacts in the context of global warming. The mathematical calculations used for SPEI are similar to the Standard Precipitation Index (SPI), but it has the advantage to include the role of evapotranspiration.	Vicente-Serrano, S. M., Beguería, S., & López-Moreno, J. I. (2010). A multiscalar drought index sensitive to global warming: the standardized precipitation evapotranspiration index. Journal of climate, 23(7), 1696-1718.
1.6 - Projected Change in Drought Occurrence (by ~2050) (score)	3.00	This risk indicator is based on multi-model simulation that applies both global climate and drought models from the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP) . A drought threshold for pre-industrial conditions was calculated based on time-series averages. Results are expressed in terms of relative change (%) in probability between pre-industrial and 2°C scenarios.	Frieler, K., Lange, S., Piontek, F., Reyer, C. P., Schewe, J., Warszawski, L., ... & Geiger, T. (2017). Assessing the impacts of 1.5 C global warming–simulation protocol of the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP2b). Geoscientific Model Development.
1.6 - Projected Change in Drought Occurrence (by ~2050) (rank)	113	This risk indicator is based on multi-model simulation that applies both global climate and drought models from the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP) . A drought threshold for pre-industrial conditions was calculated based on time-series averages. Results are expressed in terms of relative change (%) in probability between pre-industrial and 2°C scenarios.	Frieler, K., Lange, S., Piontek, F., Reyer, C. P., Schewe, J., Warszawski, L., ... & Geiger, T. (2017). Assessing the impacts of 1.5 C global warming–simulation protocol of the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP2b). Geoscientific Model Development.
2.1 - Estimated Flood Occurrence (score)	2.59	This risk indicator is based on the recurrence of floods within the 34-year time frame period of 1985 to 2019. The occurrence of floods within a given location was estimated using data from Flood Observatory, University of Colorado. The Flood Observatory use data derived from a wide variety of news, governmental, instrumental, and remote sensing source.	Brakenridge, G. R. (2019). Global active archive of large flood events. Dartmouth Flood Observatory, University of Colorado.
2.1 - Estimated Flood Occurrence (rank)	136	This risk indicator is based on the recurrence of floods within the 34-year time frame period of 1985 to 2019. The occurrence of floods within a given location was estimated using data from Flood Observatory, University of Colorado. The Flood Observatory use data derived from a wide variety of news, governmental, instrumental, and remote sensing source.	Brakenridge, G. R. (2019). Global active archive of large flood events. Dartmouth Flood Observatory, University of Colorado.

Indicator	Value	Description	Source
2.2 - Projected Change in Flood Occurrence (by ~2050) (score)	1.00	This risk indicator is based on multi-model simulation that applies both global climate and drought models from the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP). The magnitude of the flood event was defined based on 100-year return period for pre-industrial conditions. Results are expressed in terms of change (%) in probability between pre-industrial and 2°C scenarios.	Frieler, K., Lange, S., Piontek, F., Reyer, C. P., Schewe, J., Warszawski, L., ... & Geiger, T. (2017). Assessing the impacts of 1.5 C global warming–simulation protocol of the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP2b). Geoscientific Model Development.
2.2 - Projected Change in Flood Occurrence (by ~2050) (rank)	194	This risk indicator is based on multi-model simulation that applies both global climate and drought models from the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP). The magnitude of the flood event was defined based on 100-year return period for pre-industrial conditions. Results are expressed in terms of change (%) in probability between pre-industrial and 2°C scenarios.	Frieler, K., Lange, S., Piontek, F., Reyer, C. P., Schewe, J., Warszawski, L., ... & Geiger, T. (2017). Assessing the impacts of 1.5 C global warming–simulation protocol of the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP2b). Geoscientific Model Development.
3.1 - Surface Water Contamination Index (score)	2.76	The underlying data for this risk indicator is based on a broad suite of pollutants with well-documented direct or indirect negative effects on water security for both humans and freshwater biodiversity, compiled by Vörösmarty et al. (2010). The negative effects are specific to individual pollutants, ranging from impacts mediated by eutrophication such as algal blooms and oxygen depletion (e.g., caused by phosphorus and organic loading) to direct toxic effects (e.g., caused by pesticides, mercury). The overall Surface Water Contamination Index is calculated based on a range of key pollutants with different weightings according to the level of their negative effects on water security for both humans and freshwater biodiversity: soil salinization (8%), nitrogen (12%) and phosphorus (P, 13%) loading, mercury deposition (5%), pesticide loading (10%), sediment loading (17%), organic loading (as Biological Oxygen Demand, BOD; 15%), potential acidification (9%), and thermal alteration (11%).	Vörösmarty, C. J., McIntyre, P. B., Gessner, M. O., Dudgeon, D., Prusevich, A., Green, P., ... & Davies, P. M. (2010). Global threats to human water security and river biodiversity. Nature, 467(7315), 555.

Indicator	Value	Description	Source
3.1 - Surface Water Contamination Index (rank)	120	The underlying data for this risk indicator is based on a broad suite of pollutants with well-documented direct or indirect negative effects on water security for both humans and freshwater biodiversity, compiled by Vörösmarty et al. (2010). The negative effects are specific to individual pollutants, ranging from impacts mediated by eutrophication such as algal blooms and oxygen depletion (e.g., caused by phosphorus and organic loading) to direct toxic effects (e.g., caused by pesticides, mercury). The overall Surface Water Contamination Index is calculated based on a range of key pollutants with different weightings according to the level of their negative effects on water security for both humans and freshwater biodiversity: soil salinization (8%), nitrogen (12%) and phosphorus (P, 13%) loading, mercury deposition (5%), pesticide loading (10%), sediment loading (17%), organic loading (as Biological Oxygen Demand, BOD; 15%), potential acidification (9%), and thermal alteration (11%).	Vörösmarty, C. J., McIntyre, P. B., Gessner, M. O., Dudgeon, D., Prusevich, A., Green, P., ... & Davies, P. M. (2010). Global threats to human water security and river biodiversity. Nature, 467(7315), 555.
4.1 - Fragmentation Status of Rivers (score)	1.00	This risk indicator is based on the data set by Grill et al. (2019) mapping the world's free-flowing rivers. Grill et al. (2019) compiled a geometric network of the global river system and associated attributes, such as hydro-geometric properties, as well as pressure indicators to calculate an integrated connectivity status index (CSI). While only rivers with high levels of connectivity in their entire length are classified as free-flowing, rivers of CSI < 95% are considered as fragmented at a certain degree.	Grill, G., Lehner, B., Thieme, M., Geenen, B., Tickner, D., Antonelli, F., ... & Macedo, H. E. (2019). Mapping the world's free-flowing rivers. Nature, 569(7755), 215.
4.1 - Fragmentation Status of Rivers (rank)	181	This risk indicator is based on the data set by Grill et al. (2019) mapping the world's free-flowing rivers. Grill et al. (2019) compiled a geometric network of the global river system and associated attributes, such as hydro-geometric properties, as well as pressure indicators to calculate an integrated connectivity status index (CSI). While only rivers with high levels of connectivity in their entire length are classified as free-flowing, rivers of CSI < 95% are considered as fragmented at a certain degree.	Grill, G., Lehner, B., Thieme, M., Geenen, B., Tickner, D., Antonelli, F., ... & Macedo, H. E. (2019). Mapping the world's free-flowing rivers. Nature, 569(7755), 215.
4.2 - Catchment Ecosystem Services Degradation Level (tree cover loss) (score)	1.57	For this risk indicator, tree cover loss was applied as a proxy to represent catchment ecosystem services degradation since forests play an important role in terms of water regulation, supply and pollution control. The forest cover data is based on Hansen et al.'s global Landsat data at a 30-meter spatial resolution to characterize forest cover and change. The authors defined trees as vegetation taller than 5 meters in height, and forest cover loss as a stand-replacement disturbance, or a change from a forest to non-forest state, during the period 2000 – 2018.	Hansen, M. C., Potapov, P. V., Moore, R., Hancher, M., Turubanova, S. A. A., Tyukavina, A., ... & Kommareddy, A. (2013). High-resolution global maps of 21st-century forest cover change. science, 342(6160), 850-853.

Indicator	Value	Description	Source
4.2 - Catchment Ecosystem Services Degradation Level (tree cover loss) (rank)	116	For this risk indicator, tree cover loss was applied as a proxy to represent catchment ecosystem services degradation since forests play an important role in terms of water regulation, supply and pollution control. The forest cover data is based on Hansen et al.'s global Landsat data at a 30-meter spatial resolution to characterize forest cover and change. The authors defined trees as vegetation taller than 5 meters in height, and forest cover loss as a stand-replacement disturbance, or a change from a forest to non-forest state, during the period 2000 – 2018.	Hansen, M. C., Potapov, P. V., Moore, R., Hancher, M., Turubanova, S. A. A., Tyukavina, A., ... & Kommareddy, A. (2013). High-resolution global maps of 21st-century forest cover change. science, 342(6160), 850-853.
4.3 - Projected Impacts on Freshwater Biodiversity (score)	4.40	The study by Tedesco et al. (2013) to project changes [% increase or decrease] in extinction rate by ~2090 of freshwater fish due to water availability loss from climate change is used as a proxy to estimate the projected impacts on freshwater biodiversity.	Tedesco, P. A., Oberdorff, T., Cornu, J. F., Beauchard, O., Brosse, S., Dürr, H. H., ... & Hugueny, B. (2013). A scenario for impacts of water availability loss due to climate change on riverine fish extinction rates. Journal of Applied Ecology, 50(5), 1105-1115.
4.3 - Projected Impacts on Freshwater Biodiversity (rank)	19	The study by Tedesco et al. (2013) to project changes [% increase or decrease] in extinction rate by ~2090 of freshwater fish due to water availability loss from climate change is used as a proxy to estimate the projected impacts on freshwater biodiversity.	Tedesco, P. A., Oberdorff, T., Cornu, J. F., Beauchard, O., Brosse, S., Dürr, H. H., ... & Hugueny, B. (2013). A scenario for impacts of water availability loss due to climate change on riverine fish extinction rates. Journal of Applied Ecology, 50(5), 1105-1115.
5.1 - Freshwater Policy Status (SDG 6.5.1) (score)	4.00	This risk indicator is based on SDG 6.5.1. Degree of IWRM Implementation "National Water Resources Policy" indicator, which corresponds to one of the three national level indicators under the Enabling Environment category.	UN Environment (2018). Progress on integrated water resources management. Global baseline for SDG 6 Indicator 6.5.1: degree of IWRM implementation.
5.1 - Freshwater Policy Status (SDG 6.5.1) (rank)	25	This risk indicator is based on SDG 6.5.1. Degree of IWRM Implementation "National Water Resources Policy" indicator, which corresponds to one of the three national level indicators under the Enabling Environment category.	UN Environment (2018). Progress on integrated water resources management. Global baseline for SDG 6 Indicator 6.5.1: degree of IWRM implementation.
5.2 - Freshwater Law Status (SDG 6.5.1) (score)	4.00	This risk indicator is based on SDG 6.5.1. Degree of IWRM Implementation "National Water Resources Law(s)" indicator, which corresponds to one of the three national level indicators under the Enabling Environment category. For SDG 6.5.1, enabling environment depicts the conditions that help to support the implementation of IWRM, which includes legal and strategic planning tools for IWRM.	UN Environment (2018). Progress on integrated water resources management. Global baseline for SDG 6 Indicator 6.5.1: degree of IWRM implementation.

Indicator	Value	Description	Source
5.2 - Freshwater Law Status (SDG 6.5.1) (rank)	26	This risk indicator is based on SDG 6.5.1. Degree of IWRM Implementation "National Water Resources Law(s)" indicator, which corresponds to one of the three national level indicators under the Enabling Environment category. For SDG 6.5.1, enabling environment depicts the conditions that help to support the implementation of IWRM, which includes legal and strategic planning tools for IWRM.	UN Environment (2018). Progress on integrated water resources management. Global baseline for SDG 6 Indicator 6.5.1: degree of IWRM implementation.
5.3 - Implementation Status of Water Management Plans (SDG 6.5.1) (score)	3.00	This risk indicator is based on SDG 6.5.1. Degree of IWRM Implementation "National IWRM plans" indicator, which corresponds to one of the three national level indicators under the Enabling Environment category. For SDG 6.5.1, enabling environment depicts the conditions that help to support the implementation of IWRM, which includes legal and strategic planning tools for IWRM.	UN Environment (2018). Progress on integrated water resources management. Global baseline for SDG 6 Indicator 6.5.1: degree of IWRM implementation.
5.3 - Implementation Status of Water Management Plans (SDG 6.5.1) (rank)	93	This risk indicator is based on SDG 6.5.1. Degree of IWRM Implementation "National IWRM plans" indicator, which corresponds to one of the three national level indicators under the Enabling Environment category. For SDG 6.5.1, enabling environment depicts the conditions that help to support the implementation of IWRM, which includes legal and strategic planning tools for IWRM.	UN Environment (2018). Progress on integrated water resources management. Global baseline for SDG 6 Indicator 6.5.1: degree of IWRM implementation.
6.1 - Corruption Perceptions Index (score)	4.00	This risk Indicator is based on the latest Transparency International's data: the Corruption Perceptions Index 2018. This index aggregates data from a number of different sources that provide perceptions of business people and country experts on the level of corruption in the public sector.	Transparency International (2019). Corruption Perceptions Index 2018. Berlin: Transparency International.
6.1 - Corruption Perceptions Index (rank)	75	This risk Indicator is based on the latest Transparency International's data: the Corruption Perceptions Index 2018. This index aggregates data from a number of different sources that provide perceptions of business people and country experts on the level of corruption in the public sector.	Transparency International (2019). Corruption Perceptions Index 2018. Berlin: Transparency International.
6.2 - Freedom in the World Index (score)	3.00	This risk indicator is based on Freedom House (2019), an annual global report on political rights and civil liberties, composed of numerical ratings and descriptive texts for each country and a select group of territories. The 2019 edition involved more than 100 analysts and more than 30 advisers with global, regional, and issue-based expertise to covers developments in 195 countries and 14 territories from January 1, 2018, through December 31, 2018.	Freedom House (2019). Freedom in the world 2019. Washington, DC: Freedom House.

Indicator	Value	Description	Source
6.2 - Freedom in the World Index (rank)	75	This risk indicator is based on Freedom House (2019), an annual global report on political rights and civil liberties, composed of numerical ratings and descriptive texts for each country and a select group of territories. The 2019 edition involved more than 100 analysts and more than 30 advisers with global, regional, and issue-based expertise to covers developments in 195 countries and 14 territories from January 1, 2018, through December 31, 2018.	Freedom House (2019). Freedom in the world 2019. Washington, DC: Freedom House.
6.3 - Business Participation in Water Management (SDG 6.5.1) (score)	4.00	This risk indicator is based on SDG 6.5.1. Degree of IWRM Implementation "Business Participation in Water Resources Development, Management and Use" indicator, which corresponds to one of the six national level indicators under the Institutions and Participation category.	UN Environment (2018). Progress on integrated water resources management. Global baseline for SDG 6 Indicator 6.5.1: degree of IWRM implementation.
6.3 - Business Participation in Water Management (SDG 6.5.1) (rank)	26	This risk indicator is based on SDG 6.5.1. Degree of IWRM Implementation "Business Participation in Water Resources Development, Management and Use" indicator, which corresponds to one of the six national level indicators under the Institutions and Participation category.	UN Environment (2018). Progress on integrated water resources management. Global baseline for SDG 6 Indicator 6.5.1: degree of IWRM implementation.
7.1 - Management Instruments for Water Management (SDG 6.5.1) (score)	3.00	This risk indicator is based on SDG 6.5.1. Degree of IWRM Implementation "Sustainable and efficient water use management" indicator, which corresponds to one of the five national level indicators under the Management Instruments category. For SDG 6.5.1, management instruments refer to the tools and activities that enable decision-makers and users to make rational and informed choices between alternative actions.	UN Environment (2018). Progress on integrated water resources management. Global baseline for SDG 6 Indicator 6.5.1: degree of IWRM implementation.
7.1 - Management Instruments for Water Management (SDG 6.5.1) (rank)	86	This risk indicator is based on SDG 6.5.1. Degree of IWRM Implementation "Sustainable and efficient water use management" indicator, which corresponds to one of the five national level indicators under the Management Instruments category. For SDG 6.5.1, management instruments refer to the tools and activities that enable decision-makers and users to make rational and informed choices between alternative actions.	UN Environment (2018). Progress on integrated water resources management. Global baseline for SDG 6 Indicator 6.5.1: degree of IWRM implementation.

Indicator	Value	Description	Source
7.2 - Groundwater Monitoring Data Availability and Management (score)	3.00	This risk indicator is based on the data set by UN IGRAC (2019) to determine the level of availability of groundwater monitoring data at country level as groundwater management decisions rely strongly on data availability. The level of groundwater monitoring data availability for groundwater management is determined according to a combination of three criteria developed by WWF and IGRAC: 1) Status of country groundwater monitoring programme, 2) groundwater data availability for NGOs and 3) Public access to processed groundwater monitoring data.	UN IGRAC (2019). Global Groundwater Monitoring Network GGMN Portal. UN International Groundwater Resources Assessment Centre (IGRAC).
7.2 - Groundwater Monitoring Data Availability and Management (rank)	99	This risk indicator is based on the data set by UN IGRAC (2019) to determine the level of availability of groundwater monitoring data at country level as groundwater management decisions rely strongly on data availability. The level of groundwater monitoring data availability for groundwater management is determined according to a combination of three criteria developed by WWF and IGRAC: 1) Status of country groundwater monitoring programme, 2) groundwater data availability for NGOs and 3) Public access to processed groundwater monitoring data.	UN IGRAC (2019). Global Groundwater Monitoring Network GGMN Portal. UN International Groundwater Resources Assessment Centre (IGRAC).
7.3 - Density of Runoff Monitoring Stations (score)	3.08	The density of monitoring stations for water quantity was applied as proxy to develop this risk indicator. The Global Runoff Data Base was used to estimate the number of monitoring stations per 1000km2 of the main river system (data base access date: May 2018).	BfG (2019). Global Runoff Data Base. German Federal Institute of Hydrology (BfG).
7.3 - Density of Runoff Monitoring Stations (rank)	110	The density of monitoring stations for water quantity was applied as proxy to develop this risk indicator. The Global Runoff Data Base was used to estimate the number of monitoring stations per 1000km2 of the main river system (data base access date: May 2018).	BfG (2019). Global Runoff Data Base. German Federal Institute of Hydrology (BfG).
8.1 - Access to Safe Drinking Water (score)	4.00	This risk indicator is based on the Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (UNICEF/WHO) 2019 data. It provides estimates on the use of water, sanitation and hygiene by country for the period 2000-2017.	WHO & UNICEF (2019). Estimates on the use of water, sanitation and hygiene by country (2000-2017). Joint Monitoring Programme for Water Supply, Sanitation and Hygiene.
8.1 - Access to Safe Drinking Water (rank)	34	This risk indicator is based on the Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (UNICEF/WHO) 2019 data. It provides estimates on the use of water, sanitation and hygiene by country for the period 2000-2017.	WHO & UNICEF (2019). Estimates on the use of water, sanitation and hygiene by country (2000-2017). Joint Monitoring Programme for Water Supply, Sanitation and Hygiene.
8.2 - Access to Sanitation (score)	5.00	This risk indicator is based on the Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (UNICEF/WHO) 2019 data. It provides estimates on the use of water, sanitation and hygiene by country for the period 2000-2017.	WHO & UNICEF (2019). Estimates on the use of water, sanitation and hygiene by country (2000-2017). Joint Monitoring Programme for Water Supply, Sanitation and Hygiene.

Indicator	Value	Description	Source
8.2 - Access to Sanitation (rank)	36	This risk indicator is based on the Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (UNICEF/WHO) 2019 data. It provides estimates on the use of water, sanitation and hygiene by country for the period 2000-2017.	WHO & UNICEF (2019). Estimates on the use of water, sanitation and hygiene by country (2000-2017). Joint Monitoring Programme for Water Supply, Sanitation and Hygiene.
8.3 - Financing for Water Resource Development and Management (SDG 6.5.1) (score)	4.00	This risk indicator is based on the average 'Financing' score of UN SDG 6.5.1. Degree of IWRM Implementation database. UN SDG 6.5.1 database contains a category on financing which assesses different aspects related to budgeting and financing made available and used for water resources development and management from various sources.	UN Environment (2018). Progress on integrated water resources management. Global baseline for SDG 6 Indicator 6.5.1: degree of IWRM implementation.
8.3 - Financing for Water Resource Development and Management (SDG 6.5.1) (rank)	44	This risk indicator is based on the average 'Financing' score of UN SDG 6.5.1. Degree of IWRM Implementation database. UN SDG 6.5.1 database contains a category on financing which assesses different aspects related to budgeting and financing made available and used for water resources development and management from various sources.	UN Environment (2018). Progress on integrated water resources management. Global baseline for SDG 6 Indicator 6.5.1: degree of IWRM implementation.
9.1 - Cultural Diversity (score)	1.00	Water is a social and cultural good. The cultural diversity risk indicator was included in order to acknowledge that businesses face reputational risk due to the importance of freshwater for indigenous and traditional people in their daily life, religion and culture. This risk indicator is based on Oviedo and Larsen (2000) data set, which mapped the world's ethnolinguistic groups onto the WWF map of the world's ecoregions. This cross-mapping showed for the very first time the significant overlap that exists between the global geographic distribution of biodiversity and that of linguistic diversity.	Oviedo, G., Maffi, L., & Larsen, P. B. (2000). Indigenous and traditional peoples of the world and ecoregion conservation: An integrated approach to conserving the world's biological and cultural diversity. Gland: WWF (World Wide Fund for Nature) International.
9.1 - Cultural Diversity (rank)	168	Water is a social and cultural good. The cultural diversity risk indicator was included in order to acknowledge that businesses face reputational risk due to the importance of freshwater for indigenous and traditional people in their daily life, religion and culture. This risk indicator is based on Oviedo and Larsen (2000) data set, which mapped the world's ethnolinguistic groups onto the WWF map of the world's ecoregions. This cross-mapping showed for the very first time the significant overlap that exists between the global geographic distribution of biodiversity and that of linguistic diversity.	Oviedo, G., Maffi, L., & Larsen, P. B. (2000). Indigenous and traditional peoples of the world and ecoregion conservation: An integrated approach to conserving the world's biological and cultural diversity. Gland: WWF (World Wide Fund for Nature) International.
10.1 - Freshwater Endemism (score)	2.00	The underlying data set for this risk indicator comes from the Freshwater Ecoregions of the World (FEOW) 2015 data developed by WWF and TNC. Companies operating in basins with higher number of endemic fish species are exposed to higher reputational risks.	WWF & TNC (2015). Freshwater Ecoregions of the World.

Indicator	Value	Description	Source
10.1 - Freshwater Endemism (rank)	176	The underlying data set for this risk indicator comes from the Freshwater Ecoregions of the World (FEOW) 2015 data developed by WWF and TNC. Companies operating in basins with higher number of endemic fish species are exposed to higher reputational risks.	WWF & TNC (2015). Freshwater Ecoregions of the World.
10.2 - Freshwater Biodiversity Richness (score)	5.00	The underlying data set for this risk indicator comes from the Freshwater Ecoregions of the World (FEOW) 2015 data developed by WWF and TNC. Count of fish species is used as a representation of freshwater biodiversity richness. Companies operating in basins with higher number of fish species are exposed to higher reputational risks.	WWF & TNC (2015). Freshwater Ecoregions of the World.
10.2 - Freshwater Biodiversity Richness (rank)	9	The underlying data set for this risk indicator comes from the Freshwater Ecoregions of the World (FEOW) 2015 data developed by WWF and TNC. Count of fish species is used as a representation of freshwater biodiversity richness. Companies operating in basins with higher number of fish species are exposed to higher reputational risks.	WWF & TNC (2015). Freshwater Ecoregions of the World.
11.1 - National Media Coverage (score)	3.00	This risk indicator is based on joint qualitative research by WWF and Tecnoma (Typsa Group). It indicates how aware local residents typically are of water-related issues due to national media coverage. The status of the river basin (e.g., scarcity and pollution) is taken into account, as well as the importance of water for livelihoods (e.g., food and shelter).	WWF & Tecnoma (TYPSA Group)
11.1 - National Media Coverage (rank)	133	This risk indicator is based on joint qualitative research by WWF and Tecnoma (Typsa Group). It indicates how aware local residents typically are of water-related issues due to national media coverage. The status of the river basin (e.g., scarcity and pollution) is taken into account, as well as the importance of water for livelihoods (e.g., food and shelter).	WWF & Tecnoma (TYPSA Group)
11.2 - Global Media Coverage (score)	2.00	This risk indicator is based on joint qualitative research by WWF and Tecnoma (Typsa Group). It indicates how aware people are of water-related issues due to global media coverage. Familiarity to and media coverage of the region and regional water-related disasters are taken into account.	WWF & Tecnoma (TYPSA Group)
11.2 - Global Media Coverage (rank)	123	This risk indicator is based on joint qualitative research by WWF and Tecnoma (Typsa Group). It indicates how aware people are of water-related issues due to global media coverage. Familiarity to and media coverage of the region and regional water-related disasters are taken into account.	WWF & Tecnoma (TYPSA Group)

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Indicator	Value	Description	Source
12.1 - Conflict News Events (RepRisk) (score)	1.00	This risk indicator is based on 2018 data collected by RepRisk on counts and registers of documented negative incidents, criticism and controversies that can affect a company's reputational risk. These negative news events are labelled per country and industry class.	RepRisk & WWF (2019). Due diligence database on ESG and business conduct risks. RepRisk.
12.1 - Conflict News Events (RepRisk) (rank)	177	This risk indicator is based on 2018 data collected by RepRisk on counts and registers of documented negative incidents, criticism and controversies that can affect a company's reputational risk. These negative news events are labelled per country and industry class.	RepRisk & WWF (2019). Due diligence database on ESG and business conduct risks. RepRisk.
12.2 - Hydro-political Risk (score)	2.44	This risk indicator is based on the assessment of hydro-political risk by Farinosi et al. (2018). More specifically, it is based on the results of spatial modelling by Farinosi et al. (2018) that determined the main parameters affecting water cross-border conflicts and calculated the likelihood of hydro-political issues.	Farinosi, F., Giupponi, C., Reynaud, A., Ceccherini, G., Carmona-Moreno, C., De Roo, A., ... & Bidoglio, G. (2018). An innovative approach to the assessment of hydro-political risk: A spatially explicit, data driven indicator of hydro-political issues. Global environmental change, 52, 286-313.
12.2 - Hydro-political Risk (rank)	83	This risk indicator is based on the assessment of hydro-political risk by Farinosi et al. (2018). More specifically, it is based on the results of spatial modelling by Farinosi et al. (2018) that determined the main parameters affecting water cross-border conflicts and calculated the likelihood of hydro-political issues.	Farinosi, F., Giupponi, C., Reynaud, A., Ceccherini, G., Carmona-Moreno, C., De Roo, A., ... & Bidoglio, G. (2018). An innovative approach to the assessment of hydro-political risk: A spatially explicit, data driven indicator of hydro-political issues. Global environmental change, 52, 286-313.
Population, total (#)	2038501	Population, total	The World Bank 2018, Data , hompage accessed 20/04/2018
GDP (current US$)	964599178	GDP (current US$)	The World Bank 2018, Data , hompage accessed 20/04/2018
EPI 2018 score (0-100)	42.42	Environmental Performance Index	
WGI -Voice and Accountability (0-100)	27.62	Water Governance Indicator	Kaufmann, Daniel and Kraay, Aart and Mastruzzi, Massimo, The Worldwide Governance Indicators: Methodology and Analytical Issues (September 2010). World Bank Policy Research Working Paper No. 5430. Available at SSRN: https://ssrn.com/abstract=1682132

Indicator	Value	Description	Source
WGI -Political stability no violence (0-100)	13.79	Water Governance Indicator	Kaufmann, Daniel and Kraay, Aart and Mastruzzi, Massimo, The Worldwide Governance Indicators: Methodology and Analytical Issues (September 2010). World Bank Policy Research Working Paper No. 5430. Available at SSRN: https://ssrn.com/abstract=1682132
WGI - Government Effectiveness (0-100)	19.23	Water Governance Indicator	Kaufmann, Daniel and Kraay, Aart and Mastruzzi, Massimo, The Worldwide Governance Indicators: Methodology and Analytical Issues (September 2010). World Bank Policy Research Working Paper No. 5430. Available at SSRN: https://ssrn.com/abstract=1682132
WGI - Regulatory Quality (0-100)	31.73	Water Governance Indicator	Kaufmann, Daniel and Kraay, Aart and Mastruzzi, Massimo, The Worldwide Governance Indicators: Methodology and Analytical Issues (September 2010). World Bank Policy Research Working Paper No. 5430. Available at SSRN: https://ssrn.com/abstract=1682132
WGI - Rule of Law (0-100)	25.00	Water Governance Indicator	Kaufmann, Daniel and Kraay, Aart and Mastruzzi, Massimo, The Worldwide Governance Indicators: Methodology and Analytical Issues (September 2010). World Bank Policy Research Working Paper No. 5430. Available at SSRN: https://ssrn.com/abstract=1682132
WGI - Control of Corruption (0-100)	22.12	Water Governance Indicator	Kaufmann, Daniel and Kraay, Aart and Mastruzzi, Massimo, The Worldwide Governance Indicators: Methodology and Analytical Issues (September 2010). World Bank Policy Research Working Paper No. 5430. Available at SSRN: https://ssrn.com/abstract=1682132

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Indicator	Value	Description	Source
WRI BWS all industries (0-5)	0.42	WRI Baseline Water Stress (BWS)	Gassert, F., P. Reig, T. Luo, and A. Maddocks. 2013. "Aqueduct country and river basin rankings: a weighted aggregation of spatially distinct hydrological indicators." Working paper. Washington, DC: World Resources Institute, December 2013. Available online at http://wri.org/publication/aqueduct-country-river-basin-rankings.
WRI BWS Ranking (1=very high)	142	WRI Baseline Water Stress (BWS)	Gassert, F., P. Reig, T. Luo, and A. Maddocks. 2013. "Aqueduct country and river basin rankings: a weighted aggregation of spatially distinct hydrological indicators." Working paper. Washington, DC: World Resources Institute, December 2013. Available online at http://wri.org/publication/aqueduct-country-river-basin-rankings.
Baseline Water Stress (BWS) - 2020 BAU (1=very high)	135	WRI country ranking	Luo, T., R. Young, and P. Reig. 2015. "Aqueduct projected water stress rankings." Technical note. Washington, DC: World Resources Institute, August 215. Available online at http://www.wri.org/publication/aqueduct-projected-water-stress-country-rankings.
Baseline Water Stress (BWS) - 2020 Optimistic (increasing rank describes lower risk)	132	WRI country ranking	Luo, T., R. Young, and P. Reig. 2015. "Aqueduct projected water stress rankings." Technical note. Washington, DC: World Resources Institute, August 215. Available online at http://www.wri.org/publication/aqueduct-projected-water-stress-country-rankings.
Baseline Water Stress (BWS) - 2020 Pessimistic (increasing rank describes lower risk)	138	WRI country ranking	Luo, T., R. Young, and P. Reig. 2015. "Aqueduct projected water stress rankings." Technical note. Washington, DC: World Resources Institute, August 215. Available online at http://www.wri.org/publication/aqueduct-projected-water-stress-country-rankings.

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Indicator	Value	Description	Source
Baseline Water Stress (BWS) - 2030 BAU (increasing rank describes lower risk)	127	WRI country ranking	Luo, T., R. Young, and P. Reig. 2015. "Aqueduct projected water stress rankings." Technical note. Washington, DC: World Resources Institute, August 215. Available online at http://www.wri.org/publication/aqueduct-projected-water-stress-country-rankings.
Baseline Water Stress (BWS) - 2030 Optimistic (increasing rank describes lower risk)	126	WRI country ranking	Luo, T., R. Young, and P. Reig. 2015. "Aqueduct projected water stress rankings." Technical note. Washington, DC: World Resources Institute, August 215. Available online at http://www.wri.org/publication/aqueduct-projected-water-stress-country-rankings.
Baseline Water Stress (BWS) - 2030 Pessimistic (increasing rank describes lower risk)	133	WRI country ranking	Luo, T., R. Young, and P. Reig. 2015. "Aqueduct projected water stress rankings." Technical note. Washington, DC: World Resources Institute, August 215. Available online at http://www.wri.org/publication/aqueduct-projected-water-stress-country-rankings.
Baseline Water Stress (BWS) - 2040 BAU (increasing rank describes lower risk)	114	WRI country ranking	Luo, T., R. Young, and P. Reig. 2015. "Aqueduct projected water stress rankings." Technical note. Washington, DC: World Resources Institute, August 215. Available online at http://www.wri.org/publication/aqueduct-projected-water-stress-country-rankings.
Baseline Water Stress (BWS) - 2040 Optimistic (increasing rank describes lower risk)	115	WRI country ranking	Luo, T., R. Young, and P. Reig. 2015. "Aqueduct projected water stress rankings." Technical note. Washington, DC: World Resources Institute, August 215. Available online at http://www.wri.org/publication/aqueduct-projected-water-stress-country-rankings.
Baseline Water Stress (BWS) - 2040 Pessimistic (increasing rank describes lower risk)	118	WRI country ranking	Luo, T., R. Young, and P. Reig. 2015. "Aqueduct projected water stress rankings." Technical note. Washington, DC: World Resources Institute, August 215. Available online at http://www.wri.org/publication/aqueduct-projected-water-stress-country-rankings.

Water Risk Filter

Country Overview - Gambia

Indicator	Value	Description	Source
Total water footprint of national consumption (m3/a/cap)	886.88	WFN Water Footprint Data	Mekonnen, M.M. and Hoekstra, A.Y. (2011) National water footprint accounts: The green, blue and grey water footprint of production and consumption, Value of Water Research Report Series No. 50, UNESCO-IHE, Delft, the Netherlands.http://www.waterfootprint.org/Reports/Report50-NationalWaterFootprints-Vol1.pdf
Ratio external / total water footprint (%)	37.32	WFN Water Footprint Data	Mekonnen, M.M. and Hoekstra, A.Y. (2011) National water footprint accounts: The green, blue and grey water footprint of production and consumption, Value of Water Research Report Series No. 50, UNESCO-IHE, Delft, the Netherlands.http://www.waterfootprint.org/Reports/Report50-NationalWaterFootprints-Vol1.pdf
Area equipped for full control irrigation: total (1000 ha)	5.00	Aquastat - Irrigation	FAO. 2016. AQUASTAT website. Food and Agriculture Organization of the United Nations (FAO). Website accessed on 2018/04/13
Area equipped for irrigation: total (1000 ha)	5.00	Aquastat - Irrigation	FAO. 2016. AQUASTAT website. Food and Agriculture Organization of the United Nations (FAO). Website accessed on 2018/04/13
% of the area equipped for irrigation actually irrigated (%)	64.67	Aquastat - Irrigation	FAO. 2016. AQUASTAT website. Food and Agriculture Organization of the United Nations (FAO). Website accessed on 2018/04/13
Electricity production from hydroelectric sources (% of total)	0.00	World Development Indicators	The World Bank 2018, Data , hompage accessed 20/04/2018
Total internal renewable water resources (IRWR) (10^9 m3/year)	3.00	Aquastat - Water Ressources	FAO. 2016. AQUASTAT website. Food and Agriculture Organization of the United Nations (FAO). Website accessed on 2018/04/13
Total internal renewable water resources (IRWR) (10^9 m3/year)	5.00	Aquastat - Water Ressources	FAO. 2016. AQUASTAT website. Food and Agriculture Organization of the United Nations (FAO). Website accessed on 2018/04/13
Water resources: total external renewable (10^9 m3/year)	3.00	Aquastat - Water Ressources	FAO. 2016. AQUASTAT website. Food and Agriculture Organization of the United Nations (FAO). Website accessed on 2018/04/13

Country Overview - Gambia

Indicator	Value	Description	Source
Total renewable water resources (10^9 m3/year)	8.00	Aquastat - Water Ressources	FAO. 2016. AQUASTAT website. Food and Agriculture Organization of the United Nations (FAO). Website accessed on 2018/04/13
Dependency ratio (%)	62.50	Aquastat - Water Ressources	FAO. 2016. AQUASTAT website. Food and Agriculture Organization of the United Nations (FAO). Website accessed on 2018/04/13
Total renewable water resources per capita (m3/inhab/year)	4018.00	Aquastat - Water Ressources	FAO. 2016. AQUASTAT website. Food and Agriculture Organization of the United Nations (FAO). Website accessed on 2018/04/13
World happiness [0-8]	0.00	WorldHappinessReport.org	World Happiness Report, homepage accessed 20/04/2018

Country Aspects

1. PHYSICAL ASPECTS

1.1. WATER RESOURCES

1.1.1. WATER RESOURCES

The River Gambia originates in Fouta Djallon in the mountain region of western Guinea and flows through Senegal before entering the Gambia. Within the country, the River Gambia flows from east to west for about 400km. It is a major waterway and tourist attraction. Its floodplains, riverbanks and wetlands are important habitats for wildlife and play an important role in local livelihood strategies. Its flow is highly seasonal. The maximum flow occurs at the end of the rainy season in late September or October with a flow of about 1,500m3/s; the minimum dry season flow is less than 4.5m3/s. Both measurements are taken at Gouloumbo in Senegal. Because of the flat topography there is a pronounced marine influence and the river's seasonality and salinity have important repercussions on land use.

The country's total actual renewable water resources are estimated at 8km3/year, of which about 3km3 are internally produced and the remaining 5km3 represent the inflow of the River Gambia from Senegal. It is estimated that internally produced groundwater amounts to about 0.5km3/year, all of which is drained by the River Gambia and becomes the base flow of the river. Groundwater is available in all parts of the Gambia. The country is located in one of Africa's major sedimentary basins and is often referred to as the Mauritania/Senegal basin. It is characterized by two main aquifer systems with water table depths varying from 10m to 450m.

Along the river, the width of the valley varies from 20 to 40km and three major sections may be distinguished:

-the upper valley (UV), where floods occur occasionally and water is always fresh;

-the central valley (CV), where tidal influence exists but water is also fresh. In the lower CV water is fresh only during the rainy season while in the dry season, when the salt tongue moves as far as 250km upstream, it becomes brackish. Thus, in the dry season, about 220km of freshwater are left in the central and upper river divisions; and

-the lower valley (LV), where water is perennially saline because of permanent tidal influence.

Water resources comprise ground and surface water. The groundwater exists in two aquifer systems: (1) a shallow sand aquifer; and (2) a deep sandstone aquifer. The shallow sand aquifer occurs at depths of 10-50m below ground level (mbgl) and the deep sandstone aquifer is at depths greater than 250 mbgl. The current exploitation of both aquifers is minimal with only a few boreholes used for irrigated agriculture. Surface water on the other hand, is principally utilized in the central river region (CRR) where the river is perennially fresh and used for rice irrigation. The irrigated area has stagnated at around 25km2 partly because of the limitation of steep river banks (requiring pump uplift) and salinization (70km at the end of the rainy season and 250km at the end of the dry season) on the westward front and partly because of lack of sustainable irrigation systems [WAEA, 2008].

Freshwater resources in the Gambia occur in a variety of environments, but a reductionist, yet physically-based simplification, leads to two broad classes of water resources: 1) surface water; and 2) groundwater [Njie, 2009].

For surface water resources, the country counts on a few ephemeral coastal streams and two transboundary rivers. One of these, the River Gambia, is shared with the republics of Guinea, Guinea-Bissau and Senegal; the second, the Allahein River (San Pedro) is a low volume river system delineating the south-western border between the Gambia and Senegal in its lower course. Total renewable surface water resources of the country are estimated to be 6.5km^3/yr, of which 5.5km^3/yr (85 per cent) come from the upper Gambia River Basin spread over Senegal and Guinea. Within the Gambian territory, Gambian river flows are influenced by oceanic tides, affected by evaporation and rainfall, and augmented by groundwater discharge into the river and its tributaries. In recent decades, monthly flow at Gouloumbo ranges from 800m^3/s to less than 1m^3/s. One effect of this high seasonality is a 100 to 160km excursion of the salt and fresh water interface (i.e. salt front) within the estuary creating perennially saline, seasonal and perennially freshwater zones. Flows in the Allahein River are not accurately determined but are insignificant; judging from flow duration and peak floods falling well short of 10m^3/s. Specific discharge in other coastal catchments is roughly 0.5 litres/s/^{2} [Njie, 2009].

Regarding groundwater resources, the Gambia sits on top of one of the continent's major sedimentary basins referred to as the Mauritania-Senegal-Gambia-Guinea-Guinea-Bissau (MSGGGB) Basin. This is characterised by two main aquifer systems, a shallow sandstone aquifer (SSA) and deep sandstone aquifer (DSA). In places, the SSA occurs as distinct phreatic and semi-confined aquifer (SCA) units. The phreatic aquifer is found at depths ranging from 4 to 30m below ground level (mbgl), whilst the SCA occurs between 30 and 50mbgl. A Department of Water Resources Study dating from 1983 which estimates SSA reserves at 0.1km3 is probably on the low side. The deep sandstone aquifer (DSA) which occurs at depths below 250m is estimated to hold reserves in the order of 80km3 (Njie, 2009).

One to two metres' groundwater level/head fluctuations, depending on annual recharge (1.5 to 3.0km3/yr), is observed in the SCA and phreatic aquifer (Source: Department of Water Resources). All or most phreatic and SCA recharge occurs through direct infiltration. Vertical leakage and lateral inflow from Senegal account for roughly 10 per cent of the SCA recharge. Lateral inflow is the only known mechanism for DSA recharge. Where geological and hydrodynamic conditions allow for interaction between phreatic aquifer and surface water, groundwater contribution to surface water flow can be relatively substantial between January and May (Njie, M., 2009).

Threats to water resources

Water resources are subject to a several natural and human pressures including: 1) climate change and variability, 2) abstractions, 3) wastewater disposal, and 4) urbanisation. In the absence of adequate management responses, some of these pressures could even pose a threat to long-term water security (Njie, M., 2009).

Major threats to surface and groundwater resources, defined by their magnitude, persistence, and social impacts are identified as: i) depletion of water stock, and ii) pollution of water resources. Single and multiple risks posed by these threats can be summarised as creating scarcity through reduced water resources availability and suitability for multiple purposes, leading to increased development, treatment and delivery costs of water (Njie, M., 2009).

Depletion of surface water resources is not currently as significant a problem compared to quality degradation. However, water abstractions for rice irrigation, and, increasingly, plantation crops in the Upper River Region (URR) could alter the dynamics of saline intrusion in the River Gambia (Njie, M., 2009).

Risks of groundwater depletion owe a lot to increasing demand associated with population growth, but are equally amplified by urbanisation, the latter having the double effect of concentrating demand and reducing groundwater recharge (Njie, M., 2009).

In urban areas within the Kombos, where threats to groundwater quality are greatest, potential sources of pollution include: 1) quarries/surface mines, 2) leaky sanitary soakaways at public standpipes, 3) on-site sanitation systems, 4) solid waste tips/landfills, 5) unlined drainage ditches, and 6) underground storage tanks (Njie, M., 2009).

Although agricultural runoff/drainage may constitute a source of pollution of surface water, uncontrolled flow/stormwater represents the main threat to quality degradation. But since stormwater quality is not monitored (even selectively), data on traditional methods of rice irrigation provides some useful insight. Nutrient losses reported in sparse literature suggest that approximately 120t/yr of chemicals, principally NPK, urea, malathion and finitrothion, are exported from cropland areas to the River Gambia. Obviously, export rates are likely to be higher under poor water control conditions, and intensified by heavy downpours (Njie, M., 2009).

Total water withdrawal was 31.8 million m3 in 2000. The largest water user was agriculture with 21.3 million m3/year (67 per cent), followed by the municipal sector with 6.9 million m3/year (22 per cent) and industry with 3.6 million m3/year (11 per cent).

Surface water is rarely used as a source of potable water in the Gambia, because of the continuously saline conditions which exist in the lower reaches of the River Gambia and its tributaries, where the population centres and tourism facilities are located. The potable water demand for urban areas, tourism, industry, irrigation and livestock watering is supplied by groundwater sources.

In the Gambia, the resources that are made available for irrigation, especially labour, are influenced by a particularly complex network of rights and obligations in rural society. Women in rural communities traditionally play an important role in the allocation of family labour to food production tasks. The introduction of irrigation, or the technical formalization of existing water-use systems, involves in most communities a change in the traditional farming system. Women are major participants in irrigation at field level, however there is only scant evidence that they participate significantly in water management or policy decisions at system, regional or national levels.

National water use inventories have been recommended and planned but never implemented. Accordingly, relevant information is obtained from socioeconomic variables in conjunction with unit consumption rates for different uses considered (Njie, M., 2009).

Notwithstanding, the possibility of underestimating per capita demand for households is not negligible. Estimated demand and trends clearly show that irrigation and domestic water requirements account for more than 90 per cent of total demand nationwide, with irrigation alone accounting for more than 70 per cent. Demand is growing fastest in the livestock and domestic sectors. In the Kombo Peninsula, comprising coastal catchments and south bank areas close to the mouth of the Gambia estuary, where groundwater is the only source of freshwater, domestic water demand accounts for more than 50 per cent of the total and is expected to reach 80 per cent by 2050 (Njie, M., 2009).

Pumping irrigation water from the River Gambia has a potentially negative impact on the salt front in the river and thus on the environment overall. It has been estimated that if 1m3/s is pumped from the upper river during the dry season, the salt front can move up to 4km upstream.

Deforestation is a problem due to the high and ever-increasing demand for fuel wood.

In all but a few isolated pockets, groundwater quality falls within the recommended World Health Organisation (WHO) guidelines. Nonetheless, groundwater tends to be slightly acidic, with most pH values lying between 5.0 and 6.5. The presence of 2 to 5mg/litre of total dissolved solids including fluorides make the DSA water unsuitable for drinking without further treatment (Njie, 2009).

In coastal catchments and downstream of Tendaba in the Gambia River Basin where more than half the population live and industries are concentrated, surface water is not considered a source of potable water. This state of affairs owes a lot to continuously saline conditions which exist in the lower reaches of the River Gambia and its tributaries, and the patchy nature of flows and poor water quality in coastal streams. By way of comparison, groundwater is widely available and of relatively good quality. Therefore, water use follows very simple lines: 1) seasonal or perennial freshwater resources in the river Gambia are exclusively used for irrigation; and 2) groundwater is used for all other purposes, in particular domestic water supply. It should be noted that river water usage is restricted by transportation costs over long distances from the river and the need for treatment to make the water fit for human consumption. Wide availability of groundwater and easy/convenient access makes it the preferred source of water (Njie, 2009).

<h3>1.1.2.WATER USE1.1.2.WATER USE<h3>1.2.WATER QUALITY, ECOSYSTEMS AND HUMAN HEALTH1.2.WATER QUALITY, ECOSYSTEMS AND HUMAN HEALTH

2. GOVERNANCE ASPECTS

2.1.WATER INSTITUTIONS

Policy guidance and technical support for agriculture are provided by the Ministry of Agriculture (MOA) through a Central Management Unit and four main departments. The Department of Agricultural Services (DAS) is responsible for Agricultural Extension Services, the Soil and Water Management Unit (SWMU), the Crop Protection Service, the Food and Nutrition Unit, and the Agricultural Communications Unit. The SWMU is in charge of developing policies for soil and water management, land capability zoning, upland conservation and development of small-scale water control schemes in lowland rice ecologies. It is divided into five sections, one of which – the Engineering Section – is involved in irrigation development.
The Department of Water Resources (DWR) of the Ministry of Natural Resources and Environment (MNR&E) liaises closely with the SWMU.
The NWRC Act (1979) established the National Water Resources Council (NWRC), National Water Resources Committee (WRc) and Department of Water Resources (DWR) as institutions with policy and operational responsibility for management of water resources in the Gambia. In the statute book, the NWRC and WRc represent cross-sectoral consultative/coordinating bodies safeguarding sectoral interests in water resources management. Shortly after passage of the Act, inexplicable inertia set in, and a succession of institutional changes led to the self-retirement and effective demise of both the NWRC and WRc, leaving the Department of Water Resources (DWR) as the de facto surviving institution established under the Act (Njie, 2009).
In the prevailing circumstances, the six most import institutions with respect to water policy and legislation are:
1. National Assembly of The Gambia
The National Assembly of the Gambia which derives its legitimacy and powers from Chapter VII of the constitution comprises a majority of elected members from different political parties. The National Assembly has powers to pass legislation, ratify treaties and international agreements, and scrutinise government policy and administration including proposals for expenditure. The National Assembly also recognises legislation passed and policies endorsed by legislative bodies and political organs of the African Union (AU) and Economic Community of West African States (ECOWAS) to which the Gambia belongs.
2. Government Departments2. Government Departments
Department of Water ResourcesDepartment of Water Resources
The Department of Water Resources (DWR) has statutory functions in technical investigations for research and operational purposes, dissemination of information/advice to planners and developers, capacity building, and enforcement of provisions of the NWRC Act (1979). DWR also inherits by default WRc functions relating to cross-sectoral coordination, which it partially exercises through the Water Supply and Sanitation Working Group (WSWG). DWR is one of two technical departments under the Ministry of Fisheries and Water Resources.The Department of Water Resources (DWR) has statutory functions in technical investigations for research and operational purposes, dissemination of information/advice to planners and developers, capacity building, and enforcement of provisions of the NWRC Act (1979). DWR also inherits by default WRc functions relating to cross-sectoral coordination, which it partially exercises through the Water Supply and Sanitation Working Group (WSWG). DWR is one of two technical departments under the Ministry of Fisheries and Water Resources.
Department of Physical Planning and HousingDepartment of Physical Planning and Housing
Under the Physical Planning Order (1989), Physical Planning and Development Control Act (1991) and Regulations (1995), the Department of Physical Planning and Housing (DPPH) has various statutory duties and powers in relation to conservation and protection of water resources and attenuating flood risks. DPPH is one of five technical departments under the Ministry of Local Government and Lands.Under the Physical Planning Order (1989), Physical Planning and Development Control Act (1991) and Regulations (1995), the Department of Physical Planning and Housing (DPPH) has various statutory duties and powers in relation to conservation and protection of water resources and attenuating flood risks. DPPH is one of five technical departments under the Ministry of Local Government and Lands.
3. Executive Agencies3. Executive Agencies
National Environment AgencyNational Environment Agency
Section 9(2) of the National Environmental Management Act (1994), NEMA (1994), establishes the National Environment Agency (NEA) as the "principal body responsible for management of the environment", which is required to "co-ordinate all activities of the government in the field of the environment". The NEA's coordinating role, and statutory responsibilities for environmental impact assessments, environmental auditing, and public awareness building are in evidence under section 10 of NEMA (1994). The second statute governing the NEA's functions with relevance to water resources management is the Waste Management Act (1999). The Ministry of Forestry and the Environment has policy and operational oversight of the NEA.Section 9(2) of the National Environmental Management Act (1994), NEMA (1994), establishes the National Environment Agency (NEA) as the "principal body responsible for management of the environment", which is required to "co-ordinate all activities of the government in the field of the environment". The NEA's coordinating role, and statutory responsibilities for environmental impact assessments, environmental auditing, and public awareness building are in evidence under section 10 of NEMA (1994). The second statute governing the NEA's functions with relevance to water resources management is the Waste Management Act (1999). The Ministry of Forestry and the Environment has policy and operational oversight of the NEA.
Public Utilities Regulatory AuthorityPublic Utilities Regulatory Authority
The Public Utilities Regulatory Authority (PURA) is vested under its constitutive act to grant operating licenses to utilities including those providing public water supplies. PURA's statutory functions include the promotion of efficiency and economy in the water sector, and consumer protection. To this effect, PURA equally has powers to revoke operating licenses in non-improving situations of poor service provision. The Ministry of Finance and Economic Affairs has policy and operational oversight of PURA.The Public Utilities Regulatory Authority (PURA) is vested under its constitutive act to grant operating licenses to utilities including those providing public water supplies. PURA's statutory functions include the promotion of efficiency and economy in the water sector, and consumer protection. To this effect, PURA equally has powers to revoke operating

licenses in non-improving situations of poor service provision. The Ministry of Finance and Economic Affairs has policy and operational oversight of PURA.

4. Local Government Bodies4. Local Government Bodies

Local Government Authorities (LGAs) have similar responsibilities to national government vis-à-vis their constituencies. The Local Government Act (2002) consolidates LGA powers to collect property and other taxes, to receive royalty payments (for natural resources exploitation), and to raise funds for implementation of development plans within their competence. LGAs may also make bylaws to secure the efficient management of resources and the attenuation of risks and nuisances within their jurisdiction. LGAs are eligible for subventions from central government and funding from other partners towards projects of common interest.Local Government Authorities (LGAs) have similar responsibilities to national government vis-à-vis their constituencies. The Local Government Act (2002) consolidates LGA powers to collect property and other taxes, to receive royalty payments (for natural resources exploitation), and to raise funds for implementation of development plans within their competence. LGAs may also make bylaws to secure the efficient management of resources and the attenuation of risks and nuisances within their jurisdiction. LGAs are eligible for subventions from central government and funding from other partners towards projects of common interest.

Most farmers involved in irrigation/water management belong to Water User Groups. In the IFAD-led Small-Scale Water Control Project SSWCP, a three-tier organizational structure was established:Most farmers involved in irrigation/water management belong to Water User Groups. In the IFAD-led Small-Scale Water Control Project SSWCP, a three-tier organizational structure was established:

-Water User Groups (WUGs) are the smallest units, which include farmers working adjacent plots in one swamp;-Water User Groups (WUGs) are the smallest units, which include farmers working adjacent plots in one swamp;

-Swamp Development Committees (SDCs), the next level up, oversee water management issues at swamp level;-Swamp Development Committees (SDCs), the next level up, oversee water management issues at swamp level;

-Local Management Committees (LMCs) are the highest level, including representatives of all villages involved in a scheme (which can include several swamps) to resolve cross cutting and policy issues.-Local Management Committees (LMCs) are the highest level, including representatives of all villages involved in a scheme (which can include several swamps) to resolve cross cutting and policy issues.

However, none of these groups was working properly by the end of IFAD support in 1996 and both project staff and beneficiaries were unclear about responsibilities and work modalities.However, none of these groups was working properly by the end of IFAD support in 1996 and both project staff and beneficiaries were unclear about responsibilities and work modalities.

The Gambia has an irrigation potential of 800km2 of which the total water-managed area is estimated at 153.19km2 or 7 per cent of the cultivated area. All the area equipped for full or partial control irrigation is surface-irrigated, either with pumped schemes (8.18km2 or about 38 per cent of the area in 1999) or by employing tidal irrigation (13.31km2 or about 62 per cent of the area). Irrigation brings considerably increased output (a minimum of two crops instead of one rain-fed crop in a year), higher productivity due to better results of fertilizer application, and stability in production, as vagaries of weather generally do not affect irrigated agriculture except under very severe conditions (WAEA, 2008).The Gambia has an irrigation potential of 800km2 of which the total water-managed area is estimated at 153.19km2 or 7 per cent of the cultivated area. All the area equipped for full or partial control irrigation is surface-irrigated, either with pumped schemes (8.18km2 or about 38 per cent of the area in 1999) or by employing tidal irrigation (13.31km2 or about 62 per cent of the area). Irrigation brings considerably increased output (a minimum of two crops instead of one rain-fed crop in a year), higher productivity due to better results of fertilizer application, and stability in production, as vagaries of weather generally do not affect irrigated agriculture except under very severe conditions (WAEA, 2008).

Regarding the Integrated Water Resources Management (IWRM) approach, the vision of the people of the Gambia is that “the country’s water resources will be developed integrally with land and other natural resources, and managed in an efficient, environmentally sound, equitable and responsible manner by 2015, with due consideration to all varied and competing uses, in order to satisfy present societal needs and demands for water and water-related goods and services, and to preserve the ecological functions of water resources, without compromising the ability of future generations to satisfy those same needs” (Njie, 2009).Regarding the Integrated Water Resources Management (IWRM) approach, the vision of the people of the Gambia is that “the country’s water resources will be developed integrally with land and other natural resources, and managed in an efficient, environmentally sound, equitable and responsible manner by 2015, with due consideration to all varied and competing uses, in order to satisfy present societal needs and demands for water and water-related goods and services, and to preserve the ecological functions of water resources, without compromising the ability of future generations to satisfy those same needs” (Njie, 2009).

West Africa is home to eight river basins bigger than 30,000km2, roughly treble the size of the Gambia. Half of these originate from humid headwater areas in Guinea and flow through at least three countries, creating a strong interdependence among West African countries with regard to surface water resources use and management (Njie, 2009).West Africa is home to eight river basins bigger than 30,000km2, roughly treble the size of the Gambia. Half of these originate from humid headwater areas in Guinea and flow through at least three countries, creating a strong interdependence among West African countries with regard to surface water resources use and management (Njie, 2009).

In 1998, some 16 West African countries initiated a regional consultative process on IWRM, which resulted in setting up a Permanent Framework of Coordination and Monitoring (PFCM) under ECOWAS. One of the roles of the PFCM is the promotion of integration and development of the water sector at the regional level, vigorously pursued through a Water Resources Coordination Centre (WRCC) operational since 2004 (Njie, M., 2009).In 1998, some 16 West African countries initiated a regional consultative process on IWRM, which resulted in setting up a Permanent

Framework of Coordination and Monitoring (PFCM) under ECOWAS. One of the roles of the PFCM is the promotion of integration and development of the water sector at the regional level, vigorously pursued through a Water Resources Coordination Centre (WRCC) operational since 2004 (Njie, M., 2009).

The new ECOWAS IWRM framework is set out in the West African Water Resources Policy. Its general objective is to promote efficient, equitable and sustainable development thereby contributing to poverty reduction in Member States. Its guiding principles are equitable sharing of transboundary water resources, complementarity and partnership between and among communities of users, decision-making based on sound science, conflict prevention, gender equality, resources conservation, and common but circumstantial responsibilities/obligations to implement agreed measures all at once. In accordance with these principles and stated objectives, three strategic intervention areas, viz., 1) water governance, 2) investments in the water sector, and 3) regional cooperation and integration in the water sector have been elaborated. Fundamentally, all interventions correspond to economic, social, and environmental issues, or to technical infrastructure and overarching institutional frameworks (Njie, 2009).The new ECOWAS IWRM framework is set out in the West African Water Resources Policy. Its general objective is to promote efficient, equitable and sustainable development thereby contributing to poverty reduction in Member States. Its guiding principles are equitable sharing of transboundary water resources, complementarity and partnership between and among communities of users, decision-making based on sound science, conflict prevention, gender equality, resources conservation, and common but circumstantial responsibilities/obligations to implement agreed measures all at once. In accordance with these principles and stated objectives, three strategic intervention areas, viz., 1) water governance, 2) investments in the water sector, and 3) regional cooperation and integration in the water sector have been elaborated. Fundamentally, all interventions correspond to economic, social, and environmental issues, or to technical infrastructure and overarching institutional frameworks (Njie, 2009).

Institutional strategies consist of: 1) setting up an enabling legal and institutional framework, 2) promoting transboundary water resources management, 3) promoting conflict and crisis prevention and resolution mechanisms, and 4) monitoring implementation of international commitments. Technical strategies consist of: 1) developing water information and knowledge, and 2) fostering research and capacity building. Economic strategies consist of: 1) elaborating economic and financing instruments for water governance, and 2) promoting private sector participation and investment in the water sector. Social strategies consist of: 1) building capacity at subnational administrative levels, and 2) ensuring balanced gender participation in the conceptual, implementation and decision-making processes. Environmental strategies consist of developing standards for surface and groundwater quality and placing restrictions on effluent discharge, and development of sensitive areas (Njie, M., 2009).Institutional strategies consist of: 1) setting up an enabling legal and institutional framework, 2) promoting transboundary water resources management, 3) promoting conflict and crisis prevention and resolution mechanisms, and 4) monitoring implementation of international commitments. Technical strategies consist of: 1) developing water information and knowledge, and 2) fostering research and capacity building. Economic strategies consist of: 1) elaborating economic and financing instruments for water governance, and 2) promoting private sector participation and investment in the water sector. Social strategies consist of: 1) building capacity at subnational administrative levels, and 2) ensuring balanced gender participation in the conceptual, implementation and decision-making processes. Environmental strategies consist of developing standards for surface and groundwater quality and placing restrictions on effluent discharge, and development of sensitive areas (Njie, M., 2009).

In consultation with partner regional organisations, ECOWAS will soon be updating and aligning its regional action plan (RAP) on IWRM with the new policy. ECOWAS will also support a joint ECOWAS-UMEOA-CILSS programme to develop a list of indicators for monitoring implementation of the regional water policy. Monitoring of technical and financial implementation of ECOWAS programmes and projects will be done in collaboration with countries, river basin organisations, and international agencies (Njie, M., 2009).In consultation with partner regional organisations, ECOWAS will soon be updating and aligning its regional action plan (RAP) on IWRM with the new policy. ECOWAS will also support a joint ECOWAS-UMEOA-CILSS programme to develop a list of indicators for monitoring implementation of the regional water policy. Monitoring of technical and financial implementation of ECOWAS programmes and projects will be done in collaboration with countries, river basin organisations, and international agencies (Njie, M., 2009).

The National Water Policy (Policy) is the planning and management framework for providing the people of the Gambia with secure water resources. Its preparation has been the subject of a comprehensive consultation, participation, and validation process, which has included representatives from all stakeholder groups (MOFWRNAM, 2011). The President's Office has endorsed the Policy and the underpinning principles, which entail a realisation and acknowledgement of the need to (MOFWRNAM, 2011):The National Water Policy (Policy) is the planning and management framework for providing the people of the Gambia with secure water resources. Its preparation has been the subject of a comprehensive consultation, participation, and validation process, which has included representatives from all stakeholder groups (MOFWRNAM, 2011). The President's Office has endorsed the Policy and the underpinning principles, which entail a realisation and acknowledgement of the need to (MOFWRNAM, 2011):

1.Meet basic water needs in a sustainable manner while conserving resources and preserving the environment for future generations;1.Meet basic water needs in a sustainable manner while conserving resources and preserving the environment for future generations;

2.Maintain an equitable balance between universal access to water supplies and the needs of individual users;2.Maintain an equitable balance between universal access to water supplies and the needs of individual users;

3.Strengthen and develop human capital and build the economy of the country; and3.Strengthen and develop human capital and build the economy of the country; and

4.Negotiate and discharge international responsibilities in a spirit of goodwill and cooperation.4.Negotiate and discharge international responsibilities in a spirit of goodwill and

cooperation.
The Policy subscribes to the principles, and is in line with the approach to integrated water resources management (IWRM), outlined in the Dublin Statement, 1992, which asserts that (MOFWRNAM, 2011):The Policy subscribes to the principles, and is in line with the approach to integrated water resources management (IWRM), outlined in the Dublin Statement, 1992, which asserts that (MOFWRNAM, 2011):
1.Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.1.Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
2.Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.2.Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.
3.Women play a central part in the provision, management and safeguarding of water.3.Women play a central part in the provision, management and safeguarding of water.
4.Water has an economic value in all its competing uses and should be recognized as an economic good.4.Water has an economic value in all its competing uses and should be recognized as an economic good.
5.An IWRM approach promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.5.An IWRM approach promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.
The primary challenges for achieving sustainable water resources management have been reaffirmed in a number of subsequent proclamations and international conventions. These include the Millennium Development Goals (MDGs) which were defined in 2000, and the development objectives and action plan enshrined in the 2002 World Summit on Sustainable Development (WSSD). Numerous other international and African-specific directives and water-related initiatives have been launched. They have been taken into account and are reflected in this Policy, and include the New Partnership for African Development (NEPAD), and the African Ministerial Conference on Water, which forms part of NEPAD (MOFWRNAM, 2011).The primary challenges for achieving sustainable water resources management have been reaffirmed in a number of subsequent proclamations and international conventions. These include the Millennium Development Goals (MDGs) which were defined in 2000, and the development objectives and action plan enshrined in the 2002 World Summit on Sustainable Development (WSSD). Numerous other international and African-specific directives and water-related initiatives have been launched. They have been taken into account and are reflected in this Policy, and include the New Partnership for African Development (NEPAD), and the African Ministerial Conference on Water, which forms part of NEPAD (MOFWRNAM, 2011).
The overarching Policy objectives are the establishment of a manageable and inclusive water resources framework based on IWRM principles, and the promotion of an enabling environment enforced through the rule of law that (MOFWRNAM, 2011):The overarching Policy objectives are the establishment of a manageable and inclusive water resources framework based on IWRM principles, and the promotion of an enabling environment enforced through the rule of law that (MOFWRNAM, 2011):
1.Acknowledges that access to water is a common right, which is held in trust by the government on behalf of the people of the Gambia;1.Acknowledges that access to water is a common right, which is held in trust by the government on behalf of the people of the Gambia;
2.Involves people and places them at the centre of the process, consults widely with stakeholders to achieve the Policy objectives, and builds consensus;2.Involves people and places them at the centre of the process, consults widely with stakeholders to achieve the Policy objectives, and builds consensus;
3.Places environmental protection and the preservation of the country's ecological heritage at the forefront of development;3.Places environmental protection and the preservation of the country's ecological heritage at the forefront of development;
4.Defines the necessary administrative structures and defines the procedures required to implement the Policy;4.Defines the necessary administrative structures and defines the procedures required to implement the Policy;
5.Outlines the precepts, scope and timescale for a new Water Resources Strategy, which will provide the Policy's implementation platform;5.Outlines the precepts, scope and timescale for a new Water Resources Strategy, which will provide the Policy's implementation platform;
6.Establishes a sound technical rationale for managing water resources underpinned by verifiable information, and sound quantifiable hydro-meteorological and hydro-geological data;6.Establishes a sound technical rationale for managing water resources underpinned by verifiable information, and sound quantifiable hydro-meteorological and hydro-geological data;
7.Recommends a set of IWRM instruments for assessing and quantifying the available river basin yield (surface and subsurface) for a range of climatic scenarios;7.Recommends a set of IWRM instruments for assessing and quantifying the available river basin yield (surface and subsurface) for a range of climatic scenarios;
8.Describes a process whereby demand can be balanced against available resources, and a framework developed within which equitable and sustainable decisions can be taken on water allocation;8.Describes a process whereby demand can be balanced against available resources, and a framework developed within which equitable and sustainable decisions can be taken on water allocation;
9.Provides a long-term humanitarian vision for water resources management and development maximising the use of social capital; and9.Provides a long-term humanitarian vision for water resources management and development maximising the use of social capital; and
10.Requires transparency and accountability of those responsible for the custodianship of the country's water resources.10.Requires transparency and accountability of those responsible for the custodianship of the country's water resources.

The Policy is broad-based and the result of a consultative and participation process carried out with strategic stakeholders and with the support of the European Commission (EC). It is in sympathy with national development polices, designed to build ownership, and is based on international best practice. The Policy has been developed along two thematic principles (MOFWRNAM, 2011):The Policy is broad-based and the result of a consultative and participation process carried out with strategic stakeholders and with the support of the European Commission (EC). It is in sympathy with national development polices, designed to build ownership, and is based on international best practice. The Policy has been developed along two thematic principles (MOFWRNAM, 2011):

1.Water Resources Management that deals with overall cross sector management objectives and provides a framework for the:1.Water Resources Management that deals with overall cross sector management objectives and provides a framework for the:

•Establishment of an appropriate enabling environment, which balances short term gains against long term socio-economic benefits.•Establishment of an appropriate enabling environment, which balances short term gains against long term socio-economic benefits.

•Building of a dynamic people-centred technical and managerial capacity.•Building of a dynamic people-centred technical and managerial capacity.

•Preparation of a strategy which addresses short and long term demands.•Preparation of a strategy which addresses short and long term demands.

•Assessment of yield, allocation, and conservation through the application of the IWRM principles.•Assessment of yield, allocation, and conservation through the application of the IWRM principles.

•Management in the context of sustainable development and the balancing of socio-economic gain with environmental sustainability.•Management in the context of sustainable development and the balancing of socio-economic gain with environmental sustainability.

2.Water Resources Development and Utilization that deals with specific sector objectives, technical requirements, socio-economic development, and the formulation of strategies in terms of:2.Water Resources Development and Utilization that deals with specific sector objectives, technical requirements, socio-economic development, and the formulation of strategies in terms of:

•Providing potable water supplies in a sustainable and equitable manner.•Providing potable water supplies in a sustainable and equitable manner.

•Conserving water supplies and meeting the needs of agriculture in the short term and making provision for long term demands in an efficient manner.•Conserving water supplies and meeting the needs of agriculture in the short term and making provision for long term demands in an efficient manner.

•Accommodating the water needs of fisheries, navigation, industry, tourism, recreation, and hydropower in an efficient and cost-effective way.•Accommodating the water needs of fisheries, navigation, industry, tourism, recreation, and hydropower in an efficient and cost-effective way.

•Management of the natural environment in a sustainable manner.•Management of the natural environment in a sustainable manner.

The Policy implementation will require the preparation and establishment of an appropriate enabling environment. This will include a coordinated and complementary legal framework, accompanied by a parallel and wide-ranging capacity-building programme designed to equip the primary actors with the necessary technical and managerial resources. A Policy execution timeframe with sector priorities and sequential outputs has been prepared which describes the way forward (MOFWRNAM, 2011).The Policy implementation will require the preparation and establishment of an appropriate enabling environment. This will include a coordinated and complementary legal framework, accompanied by a parallel and wide-ranging capacity-building programme designed to equip the primary actors with the necessary technical and managerial resources. A Policy execution timeframe with sector priorities and sequential outputs has been prepared which describes the way forward (MOFWRNAM, 2011).

<h2>2.2.WATER MANAGEMENT2.2.WATER MANAGEMENT<h2>2.3.WATER POLICY AND LEGAL FRAMEWORK2.3.WATER POLICY AND LEGAL FRAMEWORK

3. GEOPOLITICAL ASPECTS

The Gambia is situated in the Sahelian zone on the West Coast of Africa. It is the smallest country on the African continent with a total area of 11,300km2, of which about 20 per cent is considered as wetland. The River Gambia runs from east to west, dividing the country in two strips of land 25 to 50km wide and about 300km long.

The Gambia is located entirely within the Gambia River Basin, which is shared between Senegal (77.5 per cent of the basin area), the Gambia (13 per cent), Guinea (9 per cent) and Guinea-Bissau (0.5 per cent). The Gambia signed several international agreements and conventions regarding the Gambia River Basin, namely:

-Agreement for the integrated development of the Gambia River Basin (1968);

-Convention creating the coordinating committee of the River Gambia (1976);

-Convention relating to the status of the River Gambia (1978);

-Convention relating to the creation of the Gambia River Basin Development Organization (1978).

The Gambia only shares borders with Senegal, and has two transboundary rivers: the River Gambia and Allahein (San Pedro). As mentioned elsewhere, the River Gambia is shared with the republics of Guinea, Guinea-Bissau and Senegal, whilst the Allahein River, in its lower course, delineates the south-western border between the Gambia and Senegal. To date, very little investigative work has been carried out on the Allahein, considered to be of minor interest to the Gambia and Senegal (Njie, M., 2009).

Gambia River Basin countries do not espouse IWRM as a model for water resources management under the OMVG umbrella. However, some of the organisation's planning and operational practices have similar roots with IWRM principles. Regional cooperation protocols regarding the Gambia River Basin for instance minimise the risk of conflicts and encourage equitable sharing of resources, costs and benefits of jointly-financed infrastructural developments (Njie, M., 2009).

Water uses within the Gambia River Basin are carefully considered in decades-old and recent planning studies. Integration of concerns and uses along the direction of flow (upstream-downstream) is cross-sectoral but incomplete. Politicians and their technical advisers have a monopoly in planning and decision-making. Small-scale farmers, fisherfolk and herders who previously had no input in planning and decision-making processes recently got the rare chance to do so as part of an environmental and social management plan (ESMP) associated with the planned construction of a reservoir-dam at Sambangalou (Njie, M., 2009).

Under some unwritten codes similar in effect to the prior appropriation doctrine, riparian landowners in cross-border sub-catchments take no heed of problems caused or perpetuated by developments on their land. It appears that no consent is required or exemptions specified for developments involving obstruction of flows. Sensitisation of developers or enforcement of regulations in member countries appear to be low-key or totally absent (Njie, M., 2009).

4. SOURCES

FAO. 2005. Aquastat. Available at: http://www.fao.org/nr/water/aquastat/main/index.stm [accessed February 29 2012]

Ministry of Fisheries, Water Resources and National Assembly Matters (MOFWRNAM). 2011. Available at: www.mofwrnam.gov.gm/index.php?option=com_content&view=article&id=62&Itemid=100 [accessed February 29 2012]

High Level Conference on Water for Agriculture and Energy in Africa: the Challenges of Climate Change (WAEA). National Investment Brief GAMBIA. Sirte, Libyan Arab Jamahiriya, 15-17 December 2008. Available at: www.sirtewaterandenergy.org/docs/reports/Gambia-Draft2.pdf [accessed February 29 2012]

Momodou Njie, PhD, IWRM Roadmap for The Gambia. UNEP-DHI Centre for Water and Environment. Banjul May 2009. Available at: www.unepdhi.org/iwrmwestafrica/documents/GMB-IWRMRoadmapV3.2.pdf [NB not found]