

Article

A Water Compact for Sustainable Water Management

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Abstract: The water sector in Somalia is fragmented and needs coordination to establish a functioning water governance system. Therefore, commitments from all affected stakeholders are needed to support water resources development in Somalia. This paper proposed a water compact for Somalia that can address all water sector challenges to approach sustainability. The paper starts by analyzing water sector stakeholders in Somalia, describing their missions and relationship with the compact, categorizing all selected stakeholders based on their power and interest, and identifying key stakeholders. Based on the outcome from the national workshop and the literature, a water compact was proposed highlighting possible actions to solve the identified challenges. The compact covered four thematic areas: water governance, water use and services, water resilience, and integrated water resources management, which were discussed by all engaged stakeholders in a national workshop. The water compact will ensure sustainable water resources management. The paper highlighted the need for engaging the local media and the local people to get the much needed and valued feedback for possible interventions.

Keywords: Somalia; resilience; strategic principles; stakeholders; water users; capacity building

1. Introduction

Water and development conditions in Somalia are problematic [1]. The water sector is fragmented and needs coordination to establish a functioning water governance system to solve most of the water problems, especially floods and droughts [2]. Moreover, the capacity to prioritize, manage, and deliver ongoing or proposed investment opportunities is limited due to corruption, ongoing violence, and political unrest [3].

According to the Food and Agriculture Organization (FAO) global information system on water resources and agricultural water management (FAO-AQUASTAT), the total available renewable water resources (surface and groundwaters) were estimated at 14.7 km³ and the total withdrawal water (domestic, agricultural, industrial, and environmental demands) was estimated at 3.3 km³ [4]

The following are some of the challenges that face the Somali water resources:

- **Water governance.** The water and development conditions in Somalia are problematic. Institutional capacity to prioritize, manage, and deliver ongoing or proposed investment opportunities is limited. The institutions involved in the water sector do not have clear or documented roles, which creates a conflict of responsibilities among and within the institutions involved in the water sector and competition over resources such as water project funds [1].
- **Groundwater quality.** In general, population growth and development increase the use of groundwater resources, which affects groundwater quality and may have adverse impacts on urban infrastructure [5]. In Somalia, overexploitation and pollution are the main problems facing groundwater resources as a result of lack of control and monitoring of the drilled wells and boreholes [6]. Using polluted groundwater has decreased safe drinking water resources and led to

poor hygiene and sanitation practices in many rural areas in Somalia, which has increased disease rates [7].

- **Transboundary water resources.** The construction of hydraulic infrastructures over shared water resources may often challenge cooperation and increase the possibility of conflicts over the shared water resources [8]. In Somalia, the Juba and Shabelle rivers flow from Ethiopia to the Indian Ocean, cutting across the southern part of the country. Between the Juba and Shabelle rivers, 90% of their flow originates from Ethiopia, and some from Kenya. The absence of a legally binding treaty made Ethiopia object to the Baardheere Dam and Water Infrastructure Project in Somalia [9].
- **Rainfall/Runoff.** There are two rainfall seasons: Gu, which passes through the North from mid-March to June, and Deyr, which passes through the South from mid-September to November. The average annual rainfall is about 123 mm and 75% of this annual rainfall is recorded during the Gu season (FAO 2019). The changes in temperature, precipitation, and the occurrence of extreme weather events will have an impact on species survival, forest structure, the prevalence of pest and diseases, and climate-related hazards [10].
- **Development and urbanization.** The rapid increases in urbanization put pressure on scarce land and water resources, which leads to environmental stress in many developing countries [11]. In Somalia, population and urbanization growth poses a challenge to development and poverty reduction. Therefore, the focus should be given to sustainable water services and to water use productivity in agriculture and livestock.
- **WASH sector.** The Water, Sanitation and Hygiene (WASH) sector faces many challenges in many developing countries, especially in Africa [12]. Over 47% of the Somali population does not have access to safe WASH services. According to the Somalia WASH cluster dashboard of April 2020, more than two million people are in need of preventive WASH actions, including safe drinking water, water treatment, safe excreta disposal, and hygiene promotion [13].
- **Infrastructure/Water services.** The civil war of 1991 destroyed most of Somalia's infrastructure [8]. Thus, most of the governmental water service systems went out of order. The lack of water services and the widespread poverty across the country made water one of the most difficult commodities to get in Somalia. Public–private partnerships (PPPs) are playing a vital role in providing drinking water to the people. However, improvements are needed to increase water affordability and to reach international standards [1].
- **Data.** There are many international organizations and national institutions working in Somalia, each of which has developed its own data and information, and produces new data based on various sources because of the limited availability of data in Somalia [14], which makes getting accurate data for others a difficult issue.
- **Water terrorism.** Terrorism and security issues face water infrastructures all over the world [15]. In 2010, the lack of water resources created conflicts and fights among clans over pasture and water resources, which left 20 dead and displaced thousands of families from several villages in central Somalia [16]. Insecurity poses big challenges to Somalia's short-term stability and long-term development. For example, in 2011 Al-Shabab buried the main borehole, the main water supply of the Garbaharey city—"water terrorism"—and controlled some of the water points, through which people from government-controlled areas were not allowed to fetch water, and boys were recruited to do this [17].
- **Climate change (droughts and floods).** Climate change affects all aspects of life. It can create conflicts [18]. Droughts in Somalia are common, occurring moderately every 3–4 years and severely every 7–9 years, which affect people and livestock. In 2006, thousands of Somalis fled to Kenya to escape drought, famine, and fighting. The 2011 drought devastated agriculture and livestock and resulted in 955,000 Somali refugees in neighboring countries [19]. By 2017, acute hunger had struck 6.3 million people across the country [20]; 65% of them are living in rural areas due to the loss of production, productive assets, and income sources during the drought. To change the course of people's lives, the FAO's Famine Prevention and Drought Response Plan

supported livelihoods and livestock in rural communities in 2017 [21]. Losses in the livestock sector from the 2016/17 drought were estimated at USD 2 billion [22].

In 2018, 220,000 people were displaced because of the floods, which impacted crops, shelters, infrastructure and increased the risk of the Acute Watery Diarrhea AWD/cholera [23]. More than 8000 cases of AWD/cholera were reported between December 2017 and June 2019 [24]. UNICEF and partners are carrying out protection monitoring activities in flood-affected areas. The World Bank is in the process of formulating a Flood Risk Management for Long Term Resilience.

This paper aims at developing the Somali Water Compact, by which the water sector, the people's livelihood, and water governance in Somalia will be improved. Moreover, the compact will encourage international partners to continue their logistical and financial support.

A water “compact” is an agreement between different parties focusing on managing a water resource or sector. For example, in 1922 many western states led the development of the Colorado River Compact to reduce the existing hydrological conflicts [25]. In 2011, the Liberia WASH Compact was developed, which represented the commitment of the Government of Liberia to the principles of the Sanitation and Water for All partnership [26].

2. Materials and Methods

The development of the water compact went through three steps: diagnosing the status, engaging stakeholders, and proposing the water compact.

2.1. Diagnosing the Situation

According to the introduction, the water sector in Somalia faces many challenges, which were presented in the introduction.

2.2. Engaging Stakeholders

A stakeholder is any person, organization, or group that is positively or negatively affected or can affect an issue within the water sector (decision, regulation, project, action, etc.). Stakeholders can influence the outcomes of the project starting from the planning phase and can enable its implementation, which means stakeholders may have the power to enable or block all water-related interventions. Therefore, engaging and involving stakeholders before developing the water compact can help in creating a common understanding about the issues and will open doors for real cooperation among all stakeholders, which will greatly influence the success of the proposed compact.

Stakeholder engagement was made in three steps: (1) identifying stakeholders; (2) analyzing and categorizing engaged stakeholders; and (3) holding a national technical workshop. In general, all stakeholders can be identified based on their POWER and INTEREST. These two factors generate four categories (Figure 1).

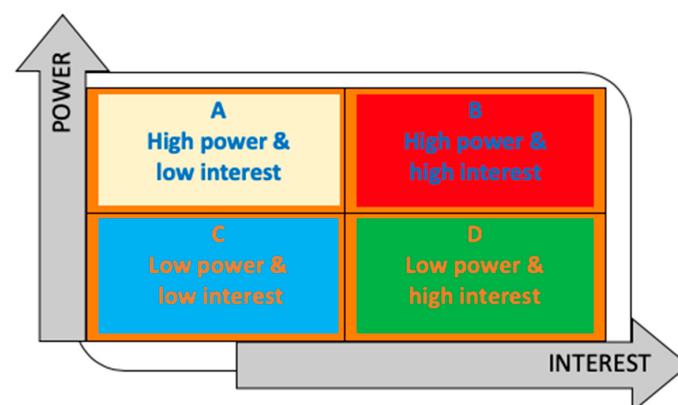


Figure 1. Stakeholders analysis.

In this study, stakeholders' identification was done through active consultations between the Office of the Prime Minister (OPM), Ministry of Energy and Water Resources (MoEWR), United Nations Development Programme (UNDP), FAO and UNICEF.

2.3. Proposing the Water Compact

Based on the strategic principles Table A1 in the Appendix A, the following commitments can be included in the water compact, covering the four thematic areas:

- Strengthen Water Governance and Cooperation;
- Ensure Equity, Productivity, and Sustainable WASH Services;
- Build Resilience and Promote Sustainable Development; and
- Enhance Integrated Water Resources Management.

3. Results and Discussion

3.1. Stakeholder Analysis

Before engaging stakeholders, all stakeholders were identified and analyzed. Minimizing the engaged stakeholders may create a lack of ownership of the project's goals and may end up creating oppositions.

Stakeholder analysis helps those running the project in

- talking to the right people;
- knowing the interests of each stakeholder;
- investigating the influence of each stakeholder on the project;
- identifying the power of each stakeholder; and
- identifying key relationships between different stakeholders.

To ensure that no important stakeholder was overlooked, the following stakeholders were included:

- Government ministries and agencies,
- NGOs (Somalia NGO Consortium),
- Research institutes/universities,
- International partners (donors),
- International governments.

Table 1 illustrates most water sector stakeholders' groups and the importance/influence of each group. These stakeholders' groups might include primary or secondary stakeholders. The goals of the project play a vital role in defining primary and secondary stakeholders:

- Primary stakeholders are those who are ultimately affected (positively or negatively); in many water sector issues/projects there are two main primary stakeholders: the project owners, and the water users (households, farmers, livestock owners, etc.);
- Secondary stakeholders are the intermediaries in the aid delivery process. They are considered important intermediaries.

Based on Figure 1, Table 2 categorizes all water sector stakeholders as the following:

- A: High power and low interest
- B: High power and high interest
- C: low power and low interest
- D: Low power and high interest

Table 1. Water sector stakeholders.

Stakeholder	Primary	Secondary	Stakeholder's Interest in the National Water Resources Strategic Plan (NWRSP)	Influence Level
Ministry of Energy and Water Resources (MoEWR) in Mogadishu and at the Federal Member States (FMS)	yes		For the NWRSP project, the ministries of water are the implementors of the project. Therefore, they can be considered primary stakeholders as they have a very strong interest in achieving the project's goals.	High
Water users (farmers, households, livestock owners)	yes		This group is the most affected by the lack of water and should be engaged.	High
OPM, MoAI, MoE, MoF, MoH, MoHADM, MoLFR, MoPIED, MPWR, MWHRD		yes	Have a strong interest to facilitate and help the implementation of any water-related project.	High
UNICEF, WVI, UNDP, FAO		yes	Funding and coordinating many water-related projects in Somalia.	High
NGO consortium		yes	Most NGOs have some activities within the water sector (Water, Sanitation and Hygiene (WASH) and food security).	Low
Other international partners		yes	They are interested in the project as they have water-related activities.	Medium
International governments		yes	They are interested in the project as they are financing some of the ongoing projects.	Medium

OPM (Office of the Prime Minister); MoAI (Ministry of Agriculture and Irrigation); MoF (Ministry of Finance); MoH (Ministry of Health); MoHADM (Ministry of Humanitarian Affairs and Disaster Management); MoLFR, (Ministry of Livestock, Forestry and Range); MoPIED (Ministry of Planning, Investments and Economic Development); MPWR (Ministry of Public Works and Reconstruction); MWHRD (Ministry of Women and Human Rights Development); WVI (World Vision International), UNDP (United Nations Development Programme).

Table 2. Water sector stakeholders and their categories.

Engaged Stakeholders			Category
Central ministries and governmental bodies	Ministry of Planning, Investments and Economic Development		A
	Ministry of Humanitarian Affairs and Disaster Management		A
	Ministry of Public Works, Reconstruction and Housing		A
	Directorate of Environment and Climate Change		B
	Ministry of Livestock, Forestry and Range		B
	Ministry of Energy and Water Resources		B
	Ministry of Agriculture and irrigation		B
	Ministry of Education		A
	Ministry of Finance		A
	Ministry of Health		A
	Office of the Prime Minister		B
	Office of the President		A
	Somalia National University		D
	Ministry of Women and Human Rights Development		D
	Somali Disaster Resilience Institute		D
Federal member states	Puntland State	MoEWR	B
	Galmudug State	MoEWR	B
	Hirshabelle State	MoEWR	B
	Jubaland State	MoEWR	B
	South West State	MoEWR	B

Table 2. Cont.

Engaged Stakeholders		Category
International partners	UNDP	B
	UNICEF	B
	FAO—Somalia Water and Land Information Management (FAO–SWALIM)	B
	World Bank	D
	Department for International Development (DFID)/ British Embassy	C
	Italian Agency for Development Cooperation (AICS)	C
	European Union (EU)	D
	European Commission (EC)	D
	German development agency (GIZ)	D
	International Organization for Migration (IOM)	B
	United States Agency for International Development (USAID)	C
	Embassy of Sweden	C
Somalia NGO consortium	Norwegian Refugee Council (NRC)	C
	Cooperation International (COOPI)	C
	Save Somali Women and Children (SSWC)	C
	Relief International (RI)	C
	Danish Refugee Council (DRC)	C
	Gargaar Relief Development Organization (GREDO)	C
	Zamzam Foundation	C
	Mercy Corps	D
	Somalia Country Water Partnership Programme (SCWPP)	D
Water users	Households, farmers, and livestock owners	D
The Private sector	Private water suppliers from the Federal Member States (FMS) and Mogadishu	D
Local media	Somali TV, radio and other local media	D

3.2. National Technical Workshop

Based on the local consultations among the OPM, MoEWR, UNDP, FAO and UNICEF, a list of the most active stakeholders in the water sector in Somalia was prepared, then the MoEWR issued an invitation letter to invite those stakeholders to a national workshop, which was held in March 2020 in Mogadishu, funded by UNDP. The workshop was designed to have the most affected, interested, and active stakeholders in Somalia, including line ministries, the Office of the Prime Minister, the Office of the President, Federal Member States, the private sector, and international partners. The participants discussed some needed principles to address water challenges in Somalia within the proposed thematic areas. The discussions during the workshop covered four thematic areas: (1) Water Governance; (2) Water Use and WASH Services; (3) Water Resilience and Sustainability; and (4) Integrated Water Resources Management. For each area, key objectives and actions were identified that could form a possible water compact.

3.3. Water Compact

Based on the National Technical Workshop a set of strategic principles was drafted covering the proposed thematic areas, Annex 1. Based on these strategic principles, the following commitments could be included in the water compact, covering the four thematic areas:

- Strengthen Water Governance and Cooperation;
- Ensure Equity, Productivity and Sustainable WASH Services;
- Build Resilience and Promote Sustainable Development;
- Enhance Integrated Water Resources Management.

3.3.1. Strengthen Water Governance and Cooperation

Water governance is a set of political, social, economic, and administrative systems that can influence water use, development, and management. Water governance occurs on multiple scales: local,

national, regional, and global levels. In Somalia, there is a need to create these systems to enable the establishment of a functioning water governance system, including water law, vision, policy, strategy, and staff capacity in Integrated Water Resources Management (IWRM). In this regard, the capacity to prioritize, manage, and deliver ongoing or proposed investment opportunities is limited and faces many challenges.

Water can promote cooperation among different organizations and institutions at national, regional, and international levels. However, roles and responsibilities need to be identified and set at federal/state, inter-ministerial, and municipality levels. A mechanism is required to coordinate initiatives and projects and to work together with the donor communities.

The water governance cycle has four components (Figure 2). Policies and strategies are based on principles; implementation is driven by actions; monitoring is guided by indicators; while the evaluation component suggests new instruments and improvements that can promote the change.



Figure 2. The water governance cycle.

To ensure good water governance and cooperation, the following issues need to be addressed:

- (1) Formulating, establishing, and implementing water policies, legislation, and institutions;
- (2) Clarifying the roles and responsibilities of government, Federal Member States (FMS), civil society, and the private sector in relation to water resources management and service development;
- (3) Developing cooperative frameworks to address climatic threats, transboundary water resources, fundraising, capacity building, and international involvement;
- (4) Promoting transparency and equity through engaging all affected stakeholders, including women, Community Based Organizations (CBOs), and NGOs, in all projects in order to get their feedback and to clear issues related to roles and responsibilities.

Therefore, to promote the mentioned issues, the following should be done:

- (1) Approve and authorize related laws, acts, policies, and strategies: In order to get the most benefit from the published laws and strategies, the partners should enhance their authorization at all levels in the different FMS. On the other hand, other laws and policies need the approval of the responsible bodies as soon as possible.
- (2) Define and clarify roles and responsibilities: To ensure that all governmental agencies, FMS, NGOs, and international partners who work in the water sector have clearly defined roles and responsibilities, the following needs to be done:

- Promote cooperative inter-state projects;
 - Establish Water Resource Management Authorities at FMS level and Water Resource Management Committees at the community level;
 - Engage, strengthen, and regulate the private sector.
- (3) Establish a water sector financial facility: An established facility will facilitate cooperation among international partners and Somalian ministries. Moreover, it will build trust between the different national and international stakeholders. To achieve this, the MoEWR, OPM, Ministry of Planning, Investments and Economic Development (MoPIED), Ministry of Finance (MOF), UNDP, FAO and other interested stakeholders can jointly discuss and develop this facility.
 - (4) Create a data and information center: To promote better evaluation of the ongoing practices and planning for future projects, a data and information center is needed. The main center can be at the MoEWR, while each of the FMS can have its local center. These centers will be connected through a network and will be updated monthly. All international partners will share their data, which will be stored in the system and made available to all interested stakeholders.
 - (5) Develop capacity building programs: Establish and strengthen institutional capacity in water governance to be able to manage water resources in an efficient manner. In cooperation with UNICEF, UNDP, the EU, and the World Bank (WB), capacity programs can be developed in three stages:
 - Define the target groups,
 - Investigate the lack of knowledge/experience, and
 - Develop training programs.
 - (6) Establish a water monitoring system: Monitoring is essential to strengthening water governance, as it is based on collecting and analyzing current information to determine its development trends. The established water resources monitoring system will cover water quality and quantity. To do this, we need to
 - Establish an equipped water monitoring lab at each water ministry;
 - Conduct training courses in monitoring design and procedures;
 - Develop programs for water resources quality monitoring, indicating responsible bodies, sampling sites, sampling frequency, and parameters to be monitored;
 - Establish a Control Data System (CDS) at each lab, which will be responsible for storing the data for future use, analyzing and converting the obtained data into applicable information that can be used in water management practices;
 - Enhance cooperation with neighboring countries, especially Ethiopia, to establish a transboundary water resources monitoring system and database.

3.3.2. Ensure Equity, Productivity, and Sustainable WASH Services

This group covers two main areas: WASH services and agriculture water. Priority areas include riparian areas in Hiraan, Gedo, Middle and Lower Shabelle and Banadir, Bay, and Lower Juba crowded settings. According to the Somalia WASH cluster, about USD 127 million is needed to provide Somalian people with access to WASH services. On the other hand, agriculture and livestock are the main contributors to Somalia's GDP.

To ensure equity and to maximize water resource benefits that include economic, social, and environmental benefits, the government of Somalia should focus on the following:

- (1) Enhancing local cooperation and engagement,
- (2) Reducing poverty,
- (3) Increasing the access to WASH services,
- (4) Investing in human capabilities,

- (5) Promoting environmentally friendly technology, and
- (6) Preparing for resilience and climate change challenges.

Therefore, to promote these benefits, the following should be done:

- (1) Establish local WASH Establishments: Each water ministry can establish its “WASH Establishment”, which can work in cooperation with UNICEF and the private sector and will have the following responsibilities:
 - Regulation of Public–private partnerships,
 - Setting proper water pricing and licensing systems,
 - Monitoring drinking water from its resources to the end users,
 - Planning of WASH services extensions and coverage, and
 - Emergency planning to cover four phases (mitigation, preparedness, response, and recovery).
- (2) Establish a WASH Investment Plan

The sector investment plan should be based on the National Water Resources Strategic Plan (NWRSP) and the WASH Establishment, and will

- Set out the WASH financing requirements to cover the people most in need of WASH actions;
- Include a separate budget line for constructing proper sanitation systems;
- Assess and include different funding scenarios and external resource requirements;
- Set a detailed finance mechanism and highlight financing gaps; and
- Develop a subsidizing mechanism.

Water subsidies will promote equity and reduce poverty. The private sector, the local authorities (WASH Establishments), local CBOs, and UNICEF will work jointly to design a national water tariff system. The tariff design should promote revenue and economic efficiency, equity and fairness, and resource conservation. Two alternative designs can be discussed: Increasing Block Tariffs (IBTs) and Uniform Price with Rebate (UPR).

- (3) Support the establishment of local CBOs

Water use associations can play a role in the restoration of the decreased environmental flow and the degraded freshwater ecosystem [27]. Moreover, CBOs play a role in increasing farmers' awareness and building their capacity regarding climate change and crop productivity [28]. Therefore, Community-Based Organizations (CBOs) will bridge the gap between communities and local authorities in Somalia through

- Raising community awareness of water productivity and climate change;
- Supporting the community in knowledge, expertise, and aids;
- Transferring governmental plans to the target areas, on the one hand, and local suffering and status to the authorities, on the other hand; and
- Promoting smart agriculture practices.

- (4) Map the areas in need of WASH services

The WASH Establishments, CBOs, and UNICEF will work jointly to map areas of need for WASH services with an estimation of the costs for each area, and then prepare a plan to cover these areas within the next five years.

(5) Develop monitoring systems

Monitoring the evaluation and reporting mechanism will be established, which will include Key Performance Indicators (KPIs). The information and data will be gathered and passed to the national water establishment to keep WASH data up to date. The monitoring systems will cover groundwater and surface water resources in cooperation with the FAO and UNICEF.

(6) Increase cultivated areas and water productivity

To increase cultivated areas, the Ministry of Agriculture and Irrigation (MoAI) in cooperation with the FAO can do the following:

- Assess the costs for rehabilitating the damaged irrigation infrastructure at river basins,
- Promote smart agriculture practices (drip irrigation using renewable energy),
- Investigate crop patterns to select best cropping alternatives based on water use and Cost-Benefit Analysis (CBA),
- Prepare project proposals to increase cultivated areas and to enhance productive water use.

(7) Prepare for extreme climate events (droughts and floods)

During drought, shallow wells and surface dams do not help. Therefore, a new emergency plan should be prepared. The MoEWR, UNICEF, and FAO may work together to

- Map the most affected areas of droughts and floods,
- Develop water resource alternatives (such as artesian wells, big tanks),
- Develop a study to direct the floodwater to big sand dams to be used for groundwater recharge and agriculture practices, and
- Prepare a study for the maintenance of the damaged infrastructure at the target areas.

(8) Construct sewage systems and treatment plants

Sewage systems and wastewater treatment plants should be planned, constructed, and managed in a sustainable manner [29]. Groundwaters, especially shallow wells, in Mogadishu are affected by the pollution that leaks from septic tanks. Therefore, the city needs a sewage system that includes a wastewater treatment plant. The MoEWR, UNICEF, and other international partners can work together to

- Prepare a detailed design and cost estimation study of the sewage system of Mogadishu that takes into account wastewater treatment alternatives;
- Contact possible donors, such as the WB, to finance a project to start in 2021–2022;
- Prepare a study of the other areas in need of sewage systems in cooperation with all FMS.

3.3.3. Build Resilience and Promote Sustainable Development

This group discussed principles related to climate change adaptation, efficient jobs, increased water availability, enhanced water resilience, and enhanced access to water resources. The group identified some objectives and actions regarding developing climate-smart agriculture, developing agriculture and livestock sectors that would enhance the national economy, managing and maintaining basic water structures, promoting job opportunities, promoting renewables, promoting water conservation and groundwater recharge measures, and promoting community management of water resources to reduce risk and promote resilience.

To address climatic threats and to promote sustainable development, the following should be taken into account:

- Build resilience into water governance: Planning for resilience involves finding the best available water resources as strategic to supporting vulnerable communities, focusing on reducing the risks associated with droughts and floods;
- Raise end user resilience and awareness: Protecting water resource quality and quantity requires attention and cooperation between suppliers and end users. Therefore, raising public and governmental awareness is a must. Moreover, water resources should be protected and treated at the point of abstraction, then monitored at selected points-of-use.
- Improve environmental performance through reducing the environmental impact of the water sector by the efficient use of water and land resources; applying the polluter pays principle and taxes; enhancing energy-efficient technology; improving cooperation by involving stakeholders.
- Promote sustainable practices at private, local, and national levels.
- Manage the cycle of storm–flood–drought.

Therefore, to address these issues, the following should be done:

(1) Establish early warning systems

An early warning system is needed to protect vulnerable areas and people from floods and droughts. This needs international cooperation and can be achieved with the help of the WB, FAO, UNDP, and Ethiopia.

(2) Develop water conservation and harvesting measures

To use stormwater in drought periods, water harvesting measures should be in place. This can be done with the help of local people, the FAO, and local ministries in each federal member state.

(3) Raise awareness of resilience and climate change

In cooperation with the FAO, UNICEF, UNDP, and local CBOs, awareness programs should be developed to reduce farmers' and livestock owners' vulnerability to climate change. Moreover, these programs should focus on sustainable practices that can mitigate the impact of climate change.

(4) Build institutional capacity for enhancing resilience to climate change

To manage climate change impacts, there is a need to strengthen the institutional capacity in three functional areas: (1) Authorization: to build and maintain political commitment and mandate institutions; (2) Resources: that include information, financing, trained staff, and influential partners to deliver and legitimize action; and (3) Implementation: to promote proposed action through enhanced collaboration with local and national partners and actors. Therefore, the MoEWR, Directorate of Environment and Climate Change (DECC), and the WB should agree to develop capacity programs that focus on resilience to climate change, targeting national ministries and FMS.

(5) Map vulnerable and threatened areas (for droughts and floods)

The MoEWR, MoAI, FAO, and UNICEF will work together to develop maps for vulnerable and threatened areas. The maps will present directions to be followed to reduce risks.

(6) Develop a risk management plan

Based on the above, the MoEWR, MoPIED, and Ministry of Humanitarian Affairs and Disaster Management (MoHADMD), in cooperation with UNICEF, will prepare a risk management plan that addresses mitigating the effects of floods and droughts in the mapped areas. Examples include using atrazine wells and surface dams during drought periods.

3.3.4. Enhance Integrated Water Resources Management

This group highlighted that the linkages between water, peace, and development should be very carefully considered, as these sectors contribute to economic growth and social equity; that development partners' projects must be realigned into government water sector priorities; that existing public–private partnership models in the country must be assessed and used in the development of the strategy; that there is a need to collate and update data on national water resources and demand; and that a short-term list of solutions should be prepared for emergency situations countrywide to help mitigate crisis situations, especially around droughts and floods.

In general, Integrated Water Resources Management (IWRM) seeks to manage water resources in a comprehensive and holistic way. IWRM is based on three principles: social equity, economic efficiency, and environmental sustainability.

IWRM aims at maximizing the economic and social welfare in an equitable manner without compromising the sustainability. It involves all water partners and stakeholders in managing and solving water-related issues [30]. Therefore, enhancing the IWRM approach requires

- Transparent and participatory decision-making procedures that set priorities based on socioeconomic and ecological objectives;
- Coordinated development and management of water, environment, land, and related resources;
- Improved appropriate legal, institutional, and financial arrangements.

Implementing the IWRM approach within the Somali context can be based on

- Ensuring social equity in terms of gender, needs, and access to water;
- Fostering economic growth to achieve economic water efficiency;
- Protecting and sustaining water resources for the sake of all current and future users;
- Ensuring equitable water allocation among all users, including the environment;
- Engaging the private and public sectors in any water project or activity;
- Raising public awareness; and
- Performing capacity building programs.

Therefore, to address these issues, the following should be done:

(1) Legal framework assessment

A central committee of water sector key stakeholders should be formed to assess water laws and policies and any other water-related action plans and standards. The assessment is needed to help identify and propose possible interventions or to identify possible gaps. Within this framework, PPPs can be managed and regulated.

(2) Establish quality control systems

Each MoEWR at the FMS should establish a water quality division to control and monitor water quality for different uses. Moreover, a new national water quality standard should be developed. Examples include:

- Used water (domestic, livestock, and irrigation),
- Wastewater discharge to water bodies, and
- Reused wastewater standards.

(3) Water resources and demand assessment

Water resources demand and assessment can be done with water models to help stakeholders in understanding the real situation, highlighting the problems and proposing solutions covering water, soil, and land practices [31–33]. Each of the FMS should prepare an assessment of its local water resources and demands. The assessment will form the base for water allocation plans and for water resources development at the FMS level.

(4) Engagement and raising awareness

Each MoEWR at the FMS may encourage the creation of CBOs and develop programs for engaging women, farmers, and other groups in awareness campaigns that focus on water saving, climate change, health, and WASH issues.

(5) Capacity building within IWRM

Each MoEWR and MoCHE at the FMS, with the help of GIZ and UNDP, should develop the capacities of some key engineers in the IWRM area. These courses can be delivered in Mogadishu or outside Somalia. Moreover, the MoCHE may propose some courses to be developed at national universities covering the issues related to IWRM in Somalia.

(6) Develop IWRM plans

To increase the trust and cooperation between governmental bodies and international partners, each of the FMS can develop an IWRM plan to address the main challenges; this should be done with the engagement of the local community, PPP, and the private sector. The plans should benefit from case studies in Africa highlighting the importance of water security [34], WASH-related issues [12], authorities and responsibility [1,35], water partnership [36], rainwater harvesting [37], post-conflict development [38], and adaptation to climate change [39].

4. Conclusions

The water sector in Somalia, as with many other African countries, faces many challenges, such as climate change, overexploitation, urbanization, and pollution. The civil war destroyed most of the irrigation schemes and collected data on the natural resources of Somalia. Moreover, the institutions involved in the water sector do not have clear or documented roles, which has created a conflict of responsibilities among and within the institutions involved in the water sector and other water sector stakeholders. Therefore, the Somalia water sector needs coordination and cooperation among its different actors and stakeholders.

This paper analyzed water challenges facing the country and then made a plan for stakeholder engagement. Through a national workshop, affected water stakeholders proposed some strategic principles, which were used to formulate the water compact.

The discussed principles were categorized in four thematic areas: (1) Water Governance; (2) Water Use and WASH Services; (3) Water Resilience and Sustainability; and (4) Integrated Water Resources Management.

The water compact was designed to be a sort of commitment among different stakeholders, by which each of the proposed actions could be implemented and achieved within a five-year plan. However, this proposal needs more elaboration from the different federal member states and each of its activities needs a real involvement from the concerned stakeholders to agree on its goal and to design its framework.

On the other hand, local press, TV, and radio in Somalia can play a useful role in the program by raising the awareness of activities among the public and by reporting and monitoring the progress of the implementation of the compact. Moreover, local media can cover the issues of the current levels of satisfaction among the public with water supply services, water rates, water metering, and other feedback about possible interventions to improve the strategy. However, this can only be done if there are active and independent TV news stations, radio talk shows, and field reporting during the implementation of any water project such as the water compact.

Finally, to bridge the gap between words and actions, the achievement of this compact should be based on milestones for each of the thematic areas. These milestones can be determined by the MoEWR, OPM, UNDP, FAO, and UNICEF.

However, there are many limitations that will affect the proposed compact, mainly corruption, funding, and the lack of active monitoring.

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Appendix A

Table A1. Strategic Principles.

Thematic Area	Strategic Principles
Water Governance	Defining roles and responsibilities for different responsible authorities at different levels, such as policy design, policy implementation, operational management and regulation.
	Enhancing coordination and collaboration between responsible authorities at federal, state and local levels.
	Managing water at the appropriate level and scale within an integrated water resources management system that can highlight local challenges and promote coordination among the different levels.
	Creating coherent policies through effective cross-sectoral coordination among different responsible authorities (MoEWR, MoA, DECC, MOH, MoHADM, MoLFR, and MoPWRH).
	Promoting monitoring and evaluation of a water governance system where appropriate, which will be the base to make adjustments when needed in pursuit of the public interest.
	Creating a water and water-related information database to guide, assess, and improve water governance system and water policy.
	Developing financial arrangements and facilities to mobilize water finance and allocate financial resources in an efficient, transparent, and timely manner.
	Engaging all affected stakeholders for outcome-oriented contributions to water policy design, management, and implementation (participatory approach).
	Mainstreaming transparency and equity across water authorities and systems to increase accountability and trust in decision making among all stakeholders.
	Encouraging the adoption of innovative water governance practices across water authorities and stakeholders to help manage trade-offs across water users.
Water Use and Services	Developing capacity development programs for the responsible authorities according to the set of competencies required to carry out their duties.
	Enhancing transboundary water resources management.
	Water resources are fairly allocated among the different sectors.
	Strategic priorities of all stakeholders are identified by the bottom-up approach.
	Water is subsidized to ensure equity and reduce poverty.
	WASH services for all.
	WASH priorities target the unserved before improving services for the served.
	Monitoring system is developed.
	Institutional capacity is enhanced.
	Climate-smart and environmentally friendly practices are enhanced.
	Community-based organizations are enhanced (farmers and livestock owners).
	Regulations for the Public–private partnerships are in place.
	Increasing cultivated lands and improving the infrastructure to reduce poverty
	Water reuse and treatment is essential.

Table A1. Cont.

Thematic Area	Strategic Principles
Water Resilience	The Somali socioeconomic systems are diversified, adapted to climate change: maintain diversity and redundancy of agriculture production (crops and livestock).
	Socioeconomic and ecological systems are well connected to recover from disasters.
	Enhance comprehensive thinking approaches among national and international experts towards actions that can foster resilience and water efficiency.
	Promote adaptive governance through knowledge sharing, participation, continuous learning, and experimentation to promote peace and stability.
	Enhance cooperation and interaction among different governing bodies to enforce rules and laws to achieve collective action that can face challenges such as early warning systems and public awareness.
	Water infrastructures are maintained and improved to reduce climatic risks and improve resilience (irrigation channels and artesian wells).
	The hydrological cycle is tapped for more water through enhancing water conservation measures (harvesting, groundwater recharge).
	Water extraction is regulated and monitored.
	Mapping drought/flood areas and groundwater aquifers.
Integrated Water Resources Management	Water resources are managed at local, national, and international levels.
	Water allocations are optimized by benefit and cost, aiming at maximizing water benefits to society per unit cost.
	PPP is regulated and managed by institutional laws and regulations.
	Full-cost pricing systems are improved and complemented by targeted subsidies.
	Rainwater and land are managed to increase water supply and reduce losses.
	Resources are available for research development for water sector/resources
	Water resources allocation is performed equitably.
	Women are engaged in water management.
	The government is committed to provide financial and human resources support.
	Systems for data and information management are developed.
	Water, land, and environmental management are integrated to ensure environmental sustainability.
	Institutional arrangements are developed to enhance stakeholders' participation, including private sector and local communities.

Table A2. Acronyms and Abbreviations.

AICS	Italian Agency for Development Cooperation
CBOs	Community-Based Organizations
COOPI	Cooperation International
CWW	Concern Worldwide
DECC	Directorate of Environment and Climate Change
DEPP	Department of Engineering and Physical Planning
DFAT	Department of Foreign Affairs and Trade, Australia
DFID	Department for International Development, UK
DRC	Danish Refugee Council
EC	European Commission
EU	European Union
FAO	Food and Agriculture Organization

Table A2. Cont.

FGS	Federal Government of Somalia
FMS	Federal Member States
GREDO	Gargaar Relief Development Organization
GWP	Global Water Partnership
IDP	Internally Displaced People
IOM	International Organization for Migration
MFMR	Ministry of Fisheries Marine Resources
MOAI	Ministry of Agriculture and Irrigation
MoCHE	Ministry Culture and Higher of Education
MoEWR	Ministry of Energy and Water Resources
MOF	Ministry of Finance
MOH	Ministry of Health
MoHADMD	Ministry of Humanitarian Affairs and Disaster Management
MoLFR	Ministry of Livestock, Forestry and Range
MoPIED	Ministry of Planning, Investments and Economic Development
MPWR	Ministry of Public Works and Reconstruction
MWHRD	Ministry of Women and Human Rights Development
NRC	The Norwegian Refugee Council
NWRSP	National Water Resources Strategic Plan
OPM	Office of the Prime Minister
PPP	Public–Private Partnership
RI	Relief International
SC	Save the Children
SCWPP	Somalia Country Water Partnership Programme
SDRI	Somali Disaster Resilience Institute
SIDA	Swedish International Development Cooperation Agency
SNU	Somalia National University
SSWC	Save Somali Women and Children
SWALIM	Somalia Water and Land Information Management
TWG	Technical Working Group
UNICEF	United Nations Children’s Fund
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
WASH	Water, Sanitation and Hygiene
WB	World Bank
WVI	World Vision International

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