

GOVERNMENT OF GHANA

**MINISTRY OF WATER RESOURCES, WORKS AND
HOUSING**

RIPARIAN BUFFER ZONE POLICY

For

Managing Freshwater Bodies in Ghana

NOVEMBER 2011

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FOREWORD

In the quest to develop as a nation, it is critical and unavoidable to ensure the sustainable management of the country's water resources. Unfortunately, the collective actions and inactions of the populace have contributed to the degraded lands resulting in the drying of rivers and streams in our communities.

There is the obvious need to devise policy guidelines and implement targeted measures to address this unfortunate situation regarding the conservation and preservation of our water resources. As a first step, the National Water Policy gives clear direction towards achieving the sustainable development, management and use of Ghana's water resources to improve health, livelihoods, and reduce vulnerability while assuring sustained water availability for future generations.

Government efforts and actions that are of priority concern to meet the stated policy objectives are to adopt sustainable practices that avoid damage to critical natural capital and irreversible ecological processes; ensure that land-use planning/building regulations are adequate and enforced in respect of waterways and flood-prone areas; manage land use and control land degradation, including bush fires, to reduce soil loss and siltation of water bodies; and establish and enforce appropriate buffer zones along river banks including measures to compensate for loss of lands.

Given this trend, the Ministry of Water Resources, Works and Housing, in concert with the Water Resources Commission (its agency charged with the regulation and management of the country's water resources), other stakeholder institutions and interest groups, in 2004, commenced the process for the formulation of a consolidated buffer zone policy. This document is the output of the interactive process initiated.

The Buffer Zone Policy is designed as a harmonized document of all the dormant and fragmented regulations in the country concerning buffers bordering water bodies or river systems. It is also designed to provide comprehensive measures and actions that would guide the coordinated creation of vegetative buffers for the preservation and functioning of our water bodies and vital ecosystems.

Given the dynamics of natural resources availability, utilization, and their management the policy needs to be reviewed periodically to incorporate necessary changes that may come with time.

I wish to take this opportunity to thank all stakeholders whose tireless efforts contributed to the development of this document. It is my expectation and hope that the key actors will be supported to ensure effective policy implementation.

Hon. Alban S. K. Bagbin, MP

Minister for Water Resources, Works & Housing

ACRONYMS

CBOs	Community Based Organizations
CSIR	Council for Scientific and Industrial Research
GIS	Geographic Information Systems
IWRM	Integrated Water Resources Management
MWRWH	Ministry of Water Resources Works and Housing
NADMO	National Disaster Management Organization
NGOs	Non-Government Organizations
NTFPs	Non-Timber Forest Products
SEA	Strategic Environment Assessment
WRC	Water Resources Commission

1. BACKGROUND AND POLICY CONTEXT

1.1 Introduction

Riparian vegetation extends along the catchment landscapes of the water bodies in Ghana and provides a wide range of socio-economic, biophysical and ecological functions. However, human induced activities such as uncontrolled logging and mining activities, human settlements, urbanization, livestock populations, and poor agricultural practices have degraded the vegetative cover at headwaters and along the banks of many river systems and other surface water bodies. These poor and unsustainable management practices are jeopardizing the physical quality of the environment, the hydrological and ecological support systems and the livelihoods of local inhabitants around these water bodies. These activities have further exposed most of Ghana's rivers and water bodies to the vagaries of the weather, and may as a result, account for the many streams and rivers, which used to be perennial, but are now experiencing periodic drying up.

Reduced vegetative cover along water bodies, coupled with increasing pollution from domestic and in some cases industrial waste, has resulted in increased sediment and nutrient loading of streams, which, and deterioration in water quality of the natural water bodies.

Furthermore, given that Africa is one of the most vulnerable regions to climate change, the disastrous impacts of climate variability and extreme events are a striking illustration of the intensification of rainstorms and instantaneous local runoffs and stream flows. In addition, the recurrent droughts in the region also continue to accelerate desertification southwards altering seasonal cycles. It is therefore anticipated that the most degraded rivers and streams both perennial and seasonal are more likely to be more susceptible to the potential impacts of the global climate change.

The Buffer Zone Policy is intended to protect, regenerate and maintain the native /established vegetation in riparian buffer zones to improve water quality by instituting proper procedures for managing and controlling the above activities along river banks and generally in catchments of surface water bodies. The document, among others, serves to clarify the requirements for water quality and quantity and to outline a national policy on buffer zones as part of managing Ghana's river basins in an integrated manner and to harmonize traditional and existing public institutional standards on buffer zones in Ghana.

Under the Water Resources Commission Act 522 (1996) Section 35(f), the Water Resources Commission (WRC) may by legislative instruments make regulations to facilitate a proper operational environment for its mandated functions. Hence, the buffer zone policy in tangible terms should be backed politically and administratively in the form of the enactment of appropriate legislative instrument (LI) to ensure compliance of stipulations in the policy, and consequently aim at correcting conditions, which adversely affect water quality and quantity from land degradation.

The policy is organized into twelve sections:

Sections 1 and 2 present the background and policy context, functions of buffer zones, the challenges in introducing buffer zones, the policy formulation process and the broad principles leading to policy formulation.

Sections 3-9 outline the key policy statement and objectives related to the basic principles and challenges and details of the main strategies with specific measures and/or actions for implementing the policy.

Sections 10-12 present the exceptions and variations to stipulated design standards for riparian buffer zones, arrangements for implementing the policy, and definitions.

1.2 Functions of Buffer Zones

Buffer zones as used in this policy context refer to the existence of physical areas that separate either two ecological systems or an ecological system from other land uses or that border a water body. The functional aspect of Riparian Buffer Zones (refer to Section 12, definition 1) can be categorized into natural (referred to herein as ecological) and human services (referred to herein as socio-economic).

1.2.1 Ecological functions

Riparian buffer zones have the capacity to:

- Improve water quality by trapping sediment and chemicals (fertilizers, pesticides, heavy metals) from runoff before they reach water courses, wetlands, lakes and reservoirs;
- Stabilize stream banks and prevent soil erosion.
- Provide a cooling effect on both terrestrial and aquatic habitats by shielding them from harmful direct sun rays;
- Provide detritus and large woody debris, which serve as food, habitats and breeding places for some aquatic and terrestrial organisms;
- Act as “connecting corridors” that enable wildlife to move safely from one habitat to another
- Serve as carbon sinks and produce oxygen
- Influence local climate
- Trap and percolate water from floods through soil into aquifers thereby contributing to groundwater recharge.

1.2.2 Socio-economic functions

- Provide local community dwellers with valuable timber and alternative sources of income from non-timber forest products (NTFPs) such as forage, fruits and wildlife;

- Provide indigenous plants of diverse species that are traditionally harvested for medicine and building materials;
- Conserve natural scenic areas of recreational value within and adjacent to riparian areas for the benefit of the community in terms of cropping and ecotourism;
- Filters impurities from water and thereby making the water more wholesome for local communities that use it for domestic and agricultural purposes;
- Support fish populations traditionally caught as an important food item in many fishing communities; and
- Marginal parts of riparian zones serve as grazing and watering areas for livestock especially during the dry season.

The most important factors to be considered in relation to the establishment of an effective buffer for water quality improvement and habitat maintenance are the catchment conditions, e.g. slope and land cover; dimension and design of buffer, e.g. width and choice of vegetation and the education of nearby communities. Hence, through the interaction of their soils, hydrology, and biotic communities, buffers perform many important physical, biological and ecological functions as well as important socio-economic benefits.

1.3 Challenges in Introducing Buffer Zones

Some of the main challenges facing the introduction and implementation of a buffer zone policy include the following:

- How to obtain public acceptance of the concept of using vegetation to buffer valuable aquatic resources from the impact of adjacent human use of the land;
- In practical terms how feasible it would be to establish buffer zones of sufficient width along the targeted river/stream courses and water bodies, particularly in built-up areas where housing, commercial and other activities have been established for a long time; and
- The realization that destruction of riparian vegetation is closely linked with poverty and demographic pressure, and in this context, the introduction and in some areas the re-establishment of buffer zones be considered as an integral part of the general socio-economic development process which need equal support to make the policy implementable.

2. POLICY FORMULATION PROCESS

Ghana acknowledges the concept of Integrated Water Resources Management (IWRM) as a means to improve the efficient use and conservation of water resources. Since 1999, the country's experience with IWRM has evolved and "lessons learnt" with interpretation of the concept and application of the principles in practice has gradually been expanded countrywide and introduced in various sector-related policies, plans and programmes.

During the early years, it was realized that one key challenge for the effective implementation of IWRM in the country is the institutionalization of policies to harmonize fragmented and dormant principles for the management of water resources and the natural environment.

In 2004 the Water Resources Commission, under the auspices of the then Ministry of Works and Housing, began operating one of its stated functions of advising the Government on any matter likely to have adverse effect on the fresh water resources of Ghana by initiating the process of developing a uniform policy for the establishment and management of buffer zones along rivers, reservoirs, lakes, etc. This was to address the prevailing situation of various institutions using varying buffer zone demarcations that are either latent or ineffectively implemented.

The process started with the compilation of legal information on the various buffer zone demarcations and regulations and followed up with preparatory activities to develop guidelines using the Densu Basin as a pilot, where the need for such measures was quite highly visible. At the end of 2005, a working document was produced that gave recommendations and set the process towards the harmonization of the fragmented buffer zone arrangements.

The next step focused on developing the technical component and the draft policy document. Institutions notably the International Water Management Institute, the Centre for African Wetlands (Legon), Water Research Institute, Forestry Commission, and the Environmental Protection Agency made substantial technical inputs towards the development of the draft document.

From the beginning of 2009 the draft policy document was subjected to series of countrywide and broad based stakeholder consultations and scrutiny to seek comments and general consensus. Finally, the process has been enhanced by applying Strategic Environmental Assessment (SEA) principles to ensure that the policy appropriately addresses environmental sustainability constraints of proposed government policy measures covering natural resources, socio-cultural, economic and institutional issues.

2.1 Guiding Principles Underlying the Buffer Zone Policy

Recognizing national perceptions and local needs as expressed in the Ghana National Water Policy and the African Water Vision 2025, the key principles that have guided the buffer zone policy preparation include the following:

- The principle of ensuring an efficient and sustainable use of buffer zone resources to address food security and income generation for local communities;

- The principle of IWRM and development using the catchment/river basin as the territorial unit for water resource planning and management; in order to ensure the sustainability of water resources in both quantity and quality;
- The principle of preventing, mitigating and managing water-related events associated with potential effects of climate variability, viz. floods and droughts;
- The principle of recognizing that socio-economic activities and the livelihoods of local communities are interlinked with the integrity of riparian aquatic ecosystems;
- The principle of subsidiarity in order to ensure the involvement of local communities through a participatory approach at all levels of decision-making in the management of buffer zones;
- The precautionary principle that seeks to minimize activities and change attitudes and perceptions that have the potential to negatively affect the integrity of water and riparian buffer zones.

3. BUFFER ZONE POLICY OBJECTIVE

3.1 Policy Statement

The buffer zone policy aims at ensuring that all designated buffer zones along rivers, streams, lakes, reservoirs and other water bodies shall be sustainably managed for all.

3.2 Overall Objectives

The overall objectives of the policy are:

- To protect, restore and maintain the ecological and livelihood –support functions of the buffer zone;
- To ensure equitable and sustainable utilization and management of buffer zone conservation areas, which will contribute to long-term well-being of both resident and downstream communities;
- To intensify capacity building, education, and training of stakeholders and ensure their commitment to the conservation of the buffer zone;
- To coordinate and harmonize policies and laws in the area of buffer zones amongst various governmental agencies with the view to achieve maximum synergy;
- To set guidelines for buffer zone designs that can be incorporated into the planning and decision making of other sectors;
- To promote research in the protection and management of buffer zones for water conservation, maintenance of ecosystem integrity and socio-economic growth;
- To encourage the development and management of buffer zones in urban and peri-urban areas by integrating natural systems into development planning; and
- To support international efforts to protect and manage buffer zones.

4. STRATEGIES FOR IMPLEMENTING THE BUFFER ZONE POLICY

Sections 5 to 9 of this policy document provide details of the strategies for the establishment of buffer zones in the country. It must be emphasized that such strategies also need to be adaptable and should respond to the dynamic nature of socio-economic circumstances and specific localized situations such as the rural-urban continuum.

The buffer zone policy emphasizes five major areas for which it sets out specific objectives and measures and/or actions within the context of the national development goals. The five identified areas are:

1. Maintaining the ecological and life-support functions of buffer zones;
2. Sustaining the multi-functionality of buffer zones;
3. Riparian buffer zones specific to urban and peri-urban areas;
4. Building capacity through research and education, training and empowerment of communities on conservation of buffer zones; and
5. Coordinating and harmonizing policies, bye-laws and traditional practices on buffer zones among government institutions and other involved parties.

The establishment of buffer zones applies to the following areas, which ideally should be identified/demarcated on a riparian buffer map:

- (i) Lands adjacent to rivers, streams, lakes and wetlands; and
- (ii) Lands at the margins of municipal reservoirs

5. MAINTAINING THE ECOSYSTEM FUNCTIONS OF BUFFER ZONES

5.1 Introduction

Buffer zones of undisturbed, moderately and highly modified natural ecosystems shall be managed to ensure the protection, maintenance and improvement of biological diversity and enhancement of ecosystem functioning. At the same time, this will provide the needed goods and services on sustainable basis to support the livelihoods of local communities.

5.2 Objectives

The policy objectives are:

- To ensure the establishment of a network of riparian buffer zones in river basins; and
- To protect the ecological integrity, geomorphologic, sacred and economic values attributed to buffer zones.

5.3 Policy measures and/or actions

In order to meet the above objectives:

- Buffer zones shall be permanently reserved by legislative instruments with the consent of local authorities;
- Buffer zones shall be incorporated into the local land-use plans;
- Efforts shall be made to minimize the risk of conversion of buffer zones to uses that are incompatible with the sustainability of their functions;
- Exclude the exploitation or occupation inimical to the purposes of designation of the areas as buffer zones; and
- Management of riparian buffer zones shall include specific limitations on alteration of the natural conditions in some areas. The following practices and activities shall be restricted within the buffer zone, except with the prior approval by the appropriate authorizing agency:
 - a. Clearing or grubbing of existing vegetation;
 - b. Clear cutting of vegetation or trees;
 - c. Soil disturbance by practices such as grading and striping;
 - d. Filling or dumping of waste;
 - e. Use, storage, or the application of pesticides, herbicides, and fertilizers; and
 - f. Conversion of existing established vegetation from majority native to majority exotic species.

6. SUSTAINING THE MULTI-FUNCTIONALITY OF BUFFER ZONES

6.1 Introduction

Riparian lands provide important environmental protection, and water resources benefits. It is necessary, therefore, to protect and maintain the beneficial character of watercourses, reservoirs, and lakes by implementing specifications for the establishment, protection, use and maintenance of strips of land along such surface water bodies.

Due to their long and linear nature, riparian buffer areas create abundant edge habitats, which are considered to be highly productive for many flora and fauna species, and for aesthetic and ecotourism purposes. It takes into account the intrinsic needs of local communities, including subsistence resource use in so far as these will not adversely affect other objectives of managing buffer zones.

6.2 Objectives

The policy objectives are:

- To manage in a sustainable manner, the communal and commercial uses of buffer zones, as well as the national and commercial needs of buffer zones for cultural and economic purposes at levels which will maintain the areas in a constructive balance between local needs and buffer zone functions;
- To bring benefits and contribute to the welfare of the local community through the provision of natural products such as forest and fish, and services such as clean water or income derived from eco-tourism or other income generating sources;
- To serve as carbon sink; and
- To provide an alternative livelihood for communities living along the buffer zones.

6.3 Policy measures and/or actions

The following measures and/or actions will be undertaken In order to sustain the multi functionality of buffer zones:

6.3.1 Riparian buffer zone management plan

- Buffer zone management plan shall be prepared by a team of qualified environmental professionals, development planners, policy implementers, women’s representatives, traditional authorities and other relevant stakeholders. The team shall fully evaluate the effects of any proposed uses on the buffer zone system, and identify the existing conditions (vegetation, extent of flood plains and their current use, soils, slopes, etc.) as well as proposed management techniques, including any measures necessary to offset disturbances to the buffer zone system.
- The plan shall be approved by the relevant river basin management institution and concerned Metropolitan, Municipal and District Assemblies, and provide

implementable information on width and demarcation of the buffer zones, ownership, management, maintenance, outlay of riparian bank stabilization and re-vegetation measures.

- Incorporate the application of GIS to improve buffer zone management and information dissemination e.g. the use of geo-referenced maps

6.3.2 Preservation of stream channel integrity and bank stability

- Restore native vegetation of trees, shrubs, herbaceous plants and grasses for the preservation of stream channel integrity and bank stability. Generally, the vegetation chosen for use in the buffer zone should form an even, dense mat and should be able to tolerate periodic flooding and drought.
- Buffer zone corridors of natural vegetation help to reduce downstream effects of floods by dissipating stream energy, temporarily storing flood waters, effectively reducing the rate of flows, and in turn increasing infiltration.
- Only vegetation within at least 10 meters of the stream channel will play an important role in bank stabilization. Increasing buffer width will continue to indirectly enhance these effects by providing additional protection and stability during extreme flood events, while trade-offs are anticipated of other land uses.
- Increase the buffer width to incorporate the flood plain/wetlands, which will also increase the potential efficiency of water storage from upstream flow during storm events.
- Ensure that alternative watering points are established outside the riparian zones to provide water for livestock. Intensive grazing along stream banks and watering of livestock directly from streams, ponds and other drinking water bodies causes stream bank damage, erosion and the resulting sediment transport and pollution of both usable and earmarked drinking water sources. Established riparian zones require the exclusion of livestock to streams, ponds and drinking water sources.

6.3.3 Promote the creation of carbon sinks

- For optimal carbon sinking, native riparian species (trees, shrubs, herbaceous plants and grasses) should be selected because they have co-evolved and adapted to the site to assure strong health and vitality.
- Trees and shrubs (non-invasive) species should be favored, with multiple values: nuts, fruits, browse, and other non-timber forest products such as cane, rattan and bamboo adapted to riverine conditions.
- Develop species diversity with similar characteristics of riparian strips that have developed naturally in areas with high water table and tolerant to wet conditions, i.e. hygrophyte species.

7. RIPARIAN BUFFER ZONES IN URBAN AND PERI-URBAN AREAS

7.1 Introduction

Access to clean water is one of the most fundamental human rights, but currently majority of the urban population in Ghana lack access to clean water. The crisis is not only due to insufficient water flows but the inability of ecosystems functions to provide clean, healthy and fresh water through the filtering effect. Because natural areas (e.g. wetlands and riparian vegetation) provide clean water at no cost, their value often goes unrecognized and they are not incorporated into planning decisions.

In most urban and peri-urban areas, sensitive natural landscapes are replaced with physical structures (e.g. roads, buildings etc.) rendering the land less able to capture water. Concrete, asphalt and rooftops do not absorb water. Instead, these impervious surfaces create runoff, directing large volumes of rainfall into gutters, trenches and canals. In the event of rainstorms, runoff overwhelms outdated and inadequate sewerage infrastructure, spilling raw or partially treated sewage into waterways, causing floods and posing a human health threat. Furthermore, the construction of unauthorized structures, establishment of settlements and conduction of ecologically unfriendly activities (mining, farming, etc.) on wetlands/flood plains or floodways and along riparian banks, reduces the ability of these natural systems to hold water and control floods. This as a consequence tends to cause severe damage to property and loss of lives.

Runoff also conveys a variety of harmful contaminants such as pesticides from agricultural farms, oil and detergents from vehicular washing bays, as well as salts, sediments, and plastics from domestic and industrial sources. These degrade drinking water quality and threaten public health. The situation is further compounded by the deliberate filling and dumping of solid and liquid waste into water bodies and along waterways.

As a result, urban and peri-urban water bodies become less suitable for drinking and less able to support the aquatic ecosystems. Contaminated drinking water has to undergo several stages of physical and chemical treatment before being distributed for public consumption. Treatment is increasingly becoming more expensive due to the rising cost of chemicals and equipment.

A subsidiary intent of this policy is to buffer all natural landscapes in urban areas including waterways in city centers to help ameliorate sewage overflows and water contamination, and integrate natural areas into urban planning.

The initiatives outlined in this section of the policy are in conformity with the United Nations Millennium Development Goal that is geared towards halving by the year 2015 the proportion of people who are unable to reach or afford safe drinking water and who are without access to basic sanitation. It is also in recognition of the Millennium Ecosystem Assessment (2005) estimates that approximately 60 percent of the world's ecosystem services are currently being degraded or used unsustainably.

7.2 Objectives

The key policy objectives are:

- To encourage the restoration and protection of riparian ecosystems and the corridors that link them to flood plains/wetlands;
- To reduce unsustainable land use practices and pollutant loads into water bodies and waterways in order to improve fresh water supply in urban and peri-urban areas
- To resource the appropriate agencies and other stakeholders to prepare and implement zoning planning schemes;
- To preserve or establish green spaces as riparian buffers along waterways in areas that are practically difficult for regeneration and reforestation of riparian vegetation as a more efficient way of preventing drinking water contamination and flooding; and
- To promote the recognition of the value of environmental services and it's sanitation implications.

7.3 Policy measures/ or actions

The objectives will be achieved by:

- Protecting, restoring and maintaining riparian buffers and flood plains as natural and long term defenses against the harmful effects of floods.
- Enforcing the 'zone/area of no development' along streams and water bodies by the removal, demolition and the prohibition of unauthorized structures and incompatible land use practices on flood plains, fringes, and corridors.
- Managing runoff as close to the source as possible by trapping rainwater, silt, sediment and debris or by directing runoff to natural infrastructure such as gardens, and green parks.
- Promoting the development/establishment of green spaces with native grass along waterways and protecting them from future encroachment and environmental damage by restricting the zone from the removal of soil, trees and other natural features except for purposes of conservation, research, recreation or uses accessory to permit uses.
- Encouraging approved edge gardening and flood recession farming only for purposes of mitigating erosion and water pollution and for sustenance of livelihoods.
- Encouraging a sense of municipal and community ownership of green spaces and provide local communities access to green space facilities (recreational parks, walkways etc.) at all times.

- Ensuring that economically important trees such as bamboo and fruit trees (e.g., mango, coconut, and pawpaw) are planted along and within the buffer for the benefit of local communities.

8. CAPACITY BUILDING OF COMMUNITIES ON CONSERVATION OF BUFFER ZONES

8.1 Introduction

There is the need to ensure the creation of national awareness and appreciation of the concept of riparian buffer zones as areas where human needs and ecological services are in a delicate imbalance and requires the public's commitment for their conservation.

8.2 Objectives

The main objectives are:

- To provide research, environmental education, training, and awareness creation at all levels in order to acquaint the public with the concepts of riparian buffer zone conservation; and
- To build capacity and empower community-based organizations including women's groups, to protect and manage buffer zone resources in collaboration with district and municipal assemblies and other user groups.

8.3 Policy measures and/or actions

Buffer zone development and management should be based on a participatory approach, involving users, planners, and policy-makers at all levels, and aim at a strong sense of community empowerment. The following aspects would be considered:

- Agree on a vision for the buffer zone concept, and promote public/community participation in the planning and decision-making processes related to buffer zone resources;
- Provide goods and services for participating communities which depend on a mixture of agricultural and forest resources to maintain their livelihood;
- Enhance public participation through education and awareness programmes in schools and local communities;
- Encourage the participation of women and other vulnerable groups in the planning and decision-making processes through the arrangement of meetings as often as possible and within the riparian communities to cater for their inability to travel long distances to partake in meetings;
- Clarify and deepen the understanding of buffer zone values, including economic benefits, through traditional as well as modern communication techniques at all levels;
- Encourage research into the roles of communities in the development and maintenance of buffer zones, amongst others;

- Provide technical and financial support as well as economic incentives to local community groups for buffer zone management and conservation, and strive to achieve equitable benefit-sharing among stakeholder groups accruing from established buffer zone¹; and
- Identify and adequately compensate landowners in order to encourage full community participation.

¹*There is the need to build incentives into buffer zone conservation management plans comparable to incentives given to forest fringe communities living around Globally Significant Biodiversity Areas (GSBAs), which is the case for some 30 forest reserves in Ghana.*

9. COORDINATION AND HARMONIZATION

9.1 Introduction

With accelerated development, the needs of communities tend to shift from the once treasured traditional buffer zone norms towards other economic gain-driven uses of riverbanks. This paradigm shift often results in practices, which can lead to pollution and degradation of the buffer strip flanking rivers especially those close to or flowing within highly populated settlements. Traditional rulers and local communities must enforce customary bye-laws on buffer zones.

In addition to the traditional practices towards protecting the river system, a number of policies, bye-laws and regulations concerning buffer width have been introduced over the years by various departments and agencies, but by and large all from a sectoral point of view, and hence, are not coordinated. An overview of existing buffer zone bye-laws and specifications is presented in the Appendix 1.

In general, existing buffer zone arrangements in Ghana varies from 10m to 100m. Any effort to determine a minimum buffer width that would sustain the river ecosystem and harmonize various organizational buffer zone stipulations should dwell within this range.

9.2 Objectives

The policy objectives are:

- To develop a buffer zone regulation, which in a balanced manner incorporates the various specifications as given in existing regulations and other specifications; and
- To develop flexible and “dynamic” stipulations that will fully accommodate local community livelihood needs, requests and practices as well as traditional views in establishing and managing buffer zones.

9.3 Policy measures and/or actions

Achieving the above objectives would require the following measures and/or actions:

9.3.1 Recommended buffer zone widths

As much as possible a 3-tier buffer zone should be the norm for effective erosion control and halting of water quality degradation caused by nutrients, animal/human wastes, sediments and run-off. A visual description of the 3-tier buffer zoning principle is presented in Appendix 2,

In many cases, however, the optimum buffer “design”, its width, etc. will vary considerably from the prescribed values along the length of a stream system due to changes in the flow regime (stream order), land uses, and to accommodate local requirements etc.

The desired minimum buffer width should be able to sustain stream protection and buffer functions over the long term and address potential future threats (like climate change), which may tend to impact negatively on runoff regime and the integrity of stream-side vegetation. Moreover, the concerns of landowners will most often constrain the width of the buffer zone to reserve enough land for food cropping or pasture management.

9.3.2 Recommended Design Standards for Riparian Buffer Zones

- a. The recommended buffer widths are:
 - Municipal reservoir shoreline protective buffer: 60 to 90 meters (e.g. Weija Dam and Lake Bosomtwe);
 - Major perennial rivers/streams: 10 to 60 meters (e.g. Volta, Tano, and Offin);
 - Minor perennial streams: 10 to 20 meters;
 - Important seasonal streams: 10 to 15 meters;
 - Streams within forest reserves: 10 to 50 meters; and
 - Wetlands: 30-meters around the perimeter as defined from the high water elevation.

Furthermore, under the 3-tier zoning concept, the buffer widths shall be modified under the following specific conditions:

- b. If there are steep slopes of between 15-30% within close proximity to the river system, the buffer may be adjusted by adding an extra 20 meters;
- c. If the land use or activity involves aboveground storage of hazardous substances or petroleum facilities, the buffer zone width shall be adjusted to include an additional 30 meters;
- d. If the land use or activity in the vicinity involves solid waste landfills or junkyards, the buffer zone width shall be adjusted to include an additional 20 meters;
- e. If the adjacent land use involves surface discharges from a wastewater treatment plant, land application of bio solids, or animal waste the buffer zone shall be governed by an enacted pollution control regulation;
- f. If the land use involves animal feed operations or intensive chemical based farming, the buffer zone width shall be adjusted to include an additional 20 meters; and
- g. If the land use involves flood recession farming where the community uses the high fertile floodplains for farming, the appropriate authorizing agency may consider a variation to the buffer zone width.

Increasing interagency liaison and communication among the various implementing ministries, departments, agencies, NGOs and other stakeholders regarding proposed buffer zone establishments shall help in harmonizing the various specifications and

stipulations. This Buffer Zone policy is an attempt to rectify the prevailing situation in this regard.

9.3.3 Role of government departments and agencies

- Buffer management plans will be prepared for all river basins showing existing and “proposed” buffer areas and proposed management techniques including monitoring and evaluation;
- Using agricultural and forestry extension staff to improve understanding of buffer zone processes and benefits; and
- Support research for buffer zone management. Buffer zone research must be oriented towards achieving the buffer zone objectives, e.g.:
 - Encouraging the use of native species of flora and fauna;
 - Maintaining certain stages of plant re-growth and succession;
 - Monitoring the effects of grazing/agricultural uses, timber harvesting economy
 - Demonstrating the achievements through partnership approaches – District Assemblies/NADMO/NGOs and local communities;
 - Developing cost-effective methods of establishing buffer zones; and
 - Supporting natural farming practices that minimize erosion and avoid inappropriate use of chemicals.

9.3.4 Role of district/municipal assemblies

The existing decentralized administrative structure in the country is a useful framework within which the participation of local communities will be solicited.

- The District Assemblies will seek to establish, where appropriate, specific bye-laws declaring buffer zones as “protected areas” to ensure the conservation of unique riparian areas, including sacred groves and stream beds in their respective localities;
- The conservation of buffer zones must conform to the land use classification in the district/municipality; and
- Buffer zone restoration shall be reflected in the environmental planning initiatives at the district and municipal level.

9.3.5 Role of traditional rulers

- Traditional land owners (heads of traditional paramount stools) will facilitate public awareness raising and issue directives concerning lands to be set aside for buffer zoning;
- Long-term management of buffer zones on communal lands should evolve ultimately into full community ownership of these buffer areas;
- Setting-up of buffer zones development committees, spearheaded by NGOs and CBOs; and
- Resource and empower local authorities and communities to enforce bye laws on buffer zones.

9.3.6 Role of Gender

Women, men and children's relationships and their respective gender roles within the context of the environment and buffer zones are crucial for the very survival of these habitats. Gender, as an important part of conservation initiatives, would therefore be included from the beginning of any initiative that aims to support and enhance conservation in riparian buffer areas. The following efforts would be pursued:

- Adopt a gender-equitable perspective for the sustainable resource management of the riparian buffer areas;
- Clarify the roles that men and women would play regarding the creation, exploitation, and management of riparian buffer zones natural resources; and
- Ensure that women participate equitably in the decision-making process concerning conservation and management activities related to public/community buffers.

9.3.7 Legislative initiatives

Government agencies may make regulations pertaining to restrictions on development activities and utilization of buffer zones, including:

a) Construction and commercial activities:

- i. Stream banks and other areas within the riparian buffer zone shall be left in a stabilized condition upon completion of development activities. The vegetative condition of the entire buffer zone shall be monitored and landscaping or stabilization performed to repair or control soil erosion during and after construction to minimize turbidity of rivers by following minimum requirements wherever practicable. Roads should as far as possible be located away from natural drainage channels;
- ii. The selection of stream crossing points which will involve a minimum of disturbance to banks and existing channels or the angle of crossing shall be perpendicular to the stream or buffer in order to minimize clearing

requirements. Where possible, the design of roadways and lots within a development should be aligned such that all streams are either to the rear or the side of individual lots, but not along the front;

- iii. Building of physical structures shall not be allowed in the riparian buffer zone with the exception of open type recreation areas, green park facilities and walking trails as approved by the appropriate authorities;
- iv. Excessive cuts and dirt accumulations, which tend to block natural drainage, will be avoided. To this effect, individual trees within the riparian buffer zone may be cut down if in danger of falling, causing damage to dwellings or other structures, or causing blockage of stream flow. The remaining root stump should be left in place, where feasible, to maintain soil stability and in-stream habitat. Requests to remove unsightly or undesirable trees that are not in danger of falling, causing damage to dwellings or other structures, or blocking of stream flow may be made to the appropriate authority on a case by case basis. The tree removal requests should not cause damage to the stream bank or the overall effectiveness of the stream's tree canopy. Should the authorized agency approve a tree removal request then replacement trees shall be planted; and
- v. Clear restriction of commercial activities like repair and washing of vehicles with likely negative impacts on water bodies, shall be enforced.

b) Logging and harvesting:

- i. A logging code requires a buffer zone of sufficient width to be established to confine within the zone any visible sediment resulting from accelerated erosion;
- ii. Selective harvesting, which often leaves residual tree stumps, and tends to reduce the extent of disturbance and runoff .in buffer zones shall be encouraged; and
- iii. With sawmill operations, no person shall dump any saw dust and other waste into any freshwater body such as rivers and lakes.

c) Farming practices:

- i. Good agronomic practices, low external input use and properly cultivated catchment areas can reduce sediment yield and other pollutants from drainage water before it enters streams or reservoirs;
- ii. Where vegetation cover is removed for agriculture, the slope must be terraced to stabilize the slope and prevent erosion;
- iii. Controlled farming can provide better protection in urban areas where natural vegetation does not provide sufficient protection for water bodies from indiscriminate waste dumping or car washing;

- iv. Livestock watering shall be limited to certain points or entirely excluded from the riparian areas when necessary in order to achieve buffer zone objectives; and
- v. Controlled grazing of livestock may be permitted as a public amenity in marginal areas outside riparian areas

d) Water pollution hazards:

The following land uses and/or activities are designated as potential water pollution hazards and must be setback from any stream or water body by the following distances:

- i. Storage of hazardous substances – 45 meters
- ii. Raised septic systems – 75 meters
- iii. Solid waste land fills – 90 meters

10. EXCEPTIONS AND VARIATIONS

10.1 Exceptions

This Buffer Zone Policy shall apply to all proposed development and redevelopment except for a development in which the construction plans were approved by the Town and Country Planning Department prior to the effective date of this policy.

10.2 Variations

1. Variations may be granted in the following specific cases:
 - i) Those projects or activities where it can be demonstrated that strict compliance with the policy regulations would result in practical difficulty or financial hardship; or
 - ii) Those projects or activities serving a public need where no feasible alternative is available; or
 - iii) The repair and maintenance of public improvements where avoidance and minimization of adverse impacts to wetlands and associated aquatic ecosystems have been addressed.
2. The authorizing agency may consider a variations to the buffer width at restrictive locations and may allow the buffer to be narrower or wider at some points so far as the width is not reduced to less than ten (10) meters perpendicular from the top of bank at any location, and the overall average width of the buffer zone meets the minimum requirement set forth in the Design Standards for the Riparian Buffer Zone.
3. For any other reason than smallholder livelihood support, the applicant shall submit a written request for a variation to the appropriate authority.
 - I. Specific reasons justifying the proposed variation and any other information necessary to evaluate the proposed variation request shall be made to the authorizing agency.
 - II. The authorizing agency may require an alternative analysis that clearly demonstrates that no other feasible alternatives exist and that minimal impact will occur as a result of the project or development in the buffer zone.
 - III. When considering a request for a variation, the authorizing agency may require additional information to establish that water quality best management practices are in place to reduce adverse impacts on water quality.

10.3 Conflict with Other Regulations

Where the standards and management requirements of this Buffer Zone Policy is in conflict with other laws, regulations, and policies regarding streams, steep slopes, erodible soils, wetlands, floodplains, timber harvesting, farming, mining and other

land disturbance activities, or other environmental protective measures, the most restrictive requirements shall apply.

11. POLICY IMPLEMENTATION ARRANGEMENTS

An important aspect of supporting the implementation of the Buffer Zone Policy is by ensuring effective inter-institutional coordination and collaboration. This is achievable by identifying and defining the roles and responsibilities of the various parties involved at national and local levels. By and large the specific roles and responsibilities of all actors have been provided (refer to section 9) but further details are presented in this section.

The partners in implementation of the buffer zone policy can be grouped as follows:

11.1 Policy formulation and guidance institutions

The Ministry of Water Resources, Works and Housing (MWRWH) is the principal ministry responsible for overall policy formulation, planning, coordination, collaboration, monitoring and evaluation of programmes for the water sector. Other ministries that are important actors for the effective implementation of the buffer zone policy are:

- Ministry of Environment, Science and Technology
- Ministry of Food and Agriculture
- Ministry of Lands and Natural Resources
- Ministry of Local Government and Rural Development
- Ministry of Women and Children Affairs
- Ministry of Energy

In addition, the District Assembly would be key at the local level. The District Assembly is the basic unit of Government at the district level and is the statutory deliberative and legislative body for the determination of broad policy objectives of the development process within their jurisdictions.

11.2 Water user and development agencies

The under listed major water user institutions are also responsible for the overall planning, development and operation of specific water infrastructure for the delivery of services such as urban and rural water supplies, irrigation, and hydropower.

- Community Water and Sanitation Agency (CWSA)
- Ghana Water Company Limited (GWCL)
- Ghana Irrigation Development Authority (GIDA)
- Volta River Authority (VRA)

11.3 Data collection and research institutions

The institutions that provide data and other water resources related information and services as well as undertake relevant research to support planning and decision making are the:

- Hydrological Services Department (HSD)
- Ghana Meteorological Agency (GMET)
- Water Research Institute (WRI/CSIR)
- Universities and renewable natural resources institutes

11.4 Regulatory agencies

It is essential to provide clear legal and regulatory framework to facilitate effective implementation of policy objectives and actions. As and when appropriate, the MWRWH shall recommend appropriate legislation to support policy implementation. The regulatory institutions with clear mandates concerning the planning, design and implementation of policy actions and measures to realize the objectives of the buffer zone policy include:

- Water Resources Commission (WRC)
- Environmental Protection Agency (EPA)
- Forestry Commission
- Lands Commission
- Fisheries Commission
- Minerals Commission
- National Development Planning Commission (NDPC)

The roles and responsibilities would be complemented by:

- Women's groups/organizations
- NGOs and CBOs (national and international)
- Traditional authorities; and
- Bilateral donors, UN organizations and other international agencies

12. DEFINITIONS

Best management practices	The physical, structural, and /or managerial practices that have been approved (by the WRC) and incorporated by reference into this policy. They include practices that when used singly or in combination, prevent or reduce pollution of water
Catchment Area	The area receiving the waters feeding a part or the totality of a watercourse.
Channel	A natural or artificial watercourse with a definite bed and banks that conveys flowing water continuously or periodically, or which forms a connecting link between two bodies of water.
Drainage basin or River basin	Area having a common outlet for its surface runoff
Erosion	The removal and transportation of soil particles by the action of water, wind, gravity or other geographical agents, whether naturally occurring or acting in conjunction with or promoted by man- made activities or effects.
Eutrophication	Enrichment of freshwater bodies by nutrients (e.g. nitrogen and phosphorus) that will accelerate the growth of algae and higher forms of plant life and a reduction in water quality and quantity.
Flooding	The overflowing of water of the normal confines of a stream or other body of water, or accumulation of water by drainage over areas, which are not normally submerged. This may result in the destruction of property as wells loss of lives and livelihoods.
Floodplain	Is a level or nearly level land along a stream or river flooded only when the streamflow exceeds the water carrying capacity of the channel. flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding.
Floodway	The channel that carries excess flood water (in excess of the quantity that can be carried safely in a tream)
Geomorphologic	Is the branch of geology that studies the form or characteristics, origins, alterations and development of landforms or the earth's surface.
Native Vegetation	Plants whose presence and survival in a specific region is not due to human intervention or is non-invasive
Perennial stream	A watercourse that flows throughout majority of the year in a well defined channel.
Peri-urban	Refers to the area that lies at the interface between urban and rural settlements. It is distinctive in its diversity, having a mix of land uses and residents who may have jobs in nearby urban areas to which they commute

Recession farming	Cultivation along exposed river/stream areas as flood waters recede
Recreation Areas	Areas designated for recreational use such as parks, greenways and nature preservations. A riparian buffer zone strictly defined, comprises only the vegetation in a stream channel and along riverbanks; However, the term has recently been used more broadly to include adjacent landscape that exerts direct influence on a water bodies and associated aquatic ecosystems. It generally encompasses undisturbed native strip of vegetation either original or established that borders streams and rivers, ponds, lakes and wetlands and is therefore the interface between terrestrial and aquatic ecosystems. It may include trees, shrubs, herbaceous plants and grasses extending from the defined edge of a stream, river or shoreline. To conserve these resources requires that buffer zones are designated to the maximum extent practicable and include best management practices that will ensure the maintenance and integrity of the waterway, biota, and habitats and reduce pollution that would result in water quality improvement and fresh water supply at low cost from well conserved water bodies.
Riparian Buffer Zone	
Runoff	That part of the precipitation, which flows towards a river on the ground surface (surface runoff) or within the soil (subsurface runoff or interflow).
Seasonal stream	A watercourse that flows in a well defined channel only in direct response to a rainfall event. It is dry for most part of the year.
Sediment	Material transported by water from the place of origin to the place of deposition. In watercourses, sediment is the alluvial material carried in suspension or as bed load.
Sedimentation	The process of settling and depositing by gravity of suspended matter in water.
Stabilization	Providing adequate vegetative and/or structural measures that will prevent or minimize the occurrence of erosion occurring.
Urban area	An area with an increased density of human-created structures in comparison to the areas surrounding it. Urban areas may be cities or towns created and further developed by the process of urbanization.
Water pollution	The state of a water body caused by the direct or indirect introduction of any undesirable substance not normally present in water e.g. micro-organisms, chemicals, waste or sewage, which renders the water unfit for its intended use.
Watercourse or Waterway	A natural or man-made channel through or along which water may flow

Water resources	Water available, or capable of being made available, for use in sufficient quantity and quality at a location and over a period of time appropriate for an identifiable demand.
Wetland	This is a shallow area that is seasonally or permanently waterlogged, and normally supports plants and animals, which have adaptations to grow wholly or partially in water.

APPENDIX 1 Overview of Existing Buffer Zone Bye-laws and Specifications

Organization	Buffer Zone Arrangement
Forest Services Division	No logging within 50m of major streams and 25m along smaller streams.
Wildlife Division (Protected Areas)	Three-tier buffer concept, i.e. core zone, support zone and management zone; however, no buffer zone width specified.
Town and Country Planning Department	A no-development buffer area, 300m wide, between water body and development area.
Ministry of Lands, Forestry and Mines	Minimum of 100m off water mark should be declared as protected areas
Ghana Water Company Limited (GWCL-Weija)	For Weija reservoir, approximately 15m (50ft) contour line above mean sea level, which determines the reservoir buffer area.
Hydrological Services Department	From 10m to 30m along both banks of major drains and water courses in Accra-Tema metro area.
VRA, IDA, EPA, DAs, Land/Water Management Unit of MOFA, NGOs (GOFA, ADRA, Green Earth – Ghana) and local communities (Oparekrom and Densuano)	Not well documented/ not clearly defined.

APPENDIX 2 Functions Provided by 3 -Tier Buffer Zoning System

