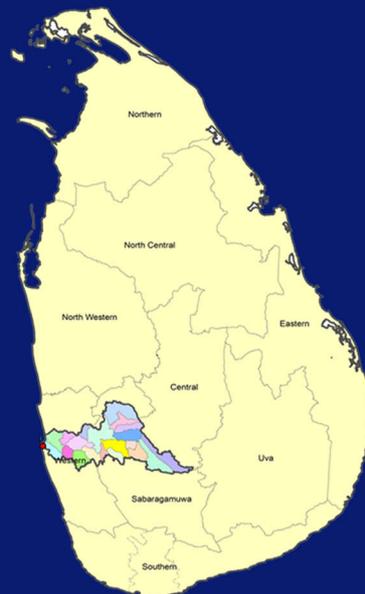


# Preliminary Perception Survey



**Medium to Long-term Multi-stakeholder Strategy and Action Plan for  
Management and Conservation of the Kelani River Basin**



unicef



**Medium to Long-term Multi-Stakeholder Strategy and Action  
Plan for Management and Conservation of the  
Kelani River Basin  
2016-2020**

**Preliminary Perception Survey on  
Water safety in the Kelani River Basin**

January 2016

*This preliminary perception survey was carried out by the Central Environment Authority (CEA) and International Union for the Conservation of Nature (IUCN) Sri Lanka Country Office to support the design of the “Medium to Long-term Multi-Stakeholder Strategy and Action Plan for Management and Conservation of the Kelani River Basin” formulated with the participation of a large stakeholder group, with the technical inputs from Ministry of City Planning and Water Supply and United Nations Children’s Fund (UNICEF).*

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## Executive Summary

Medium to Long-Term Multi-Stakeholder Strategy and Action plan for the Management and Conservation of the Kelani River Basin or the Kelani River Multi-Stakeholder Partnership (KRMP) approach, in short involves over 50 state sector agencies, non-state sector agencies, private sector, communities, international agencies, universities, media and others. The purpose of the KRMP approach is to restore the Kelani River ecosystem as the Kelani River water and the environment is being polluted by multiple sources. Identified key sources of pollution are the industry, poor land use, weak local authority services compounded by governance and awareness issues.

This preliminary perception survey was conducted as part of the KRMP approach development. The main purpose of carrying out this preliminary perception survey using limited resources and time is to better understand the technical, logistical, training and other needs required for the formal perception surveys to be planned and executed during the KRMP implementation.

Ministry of Health and Central Environment Authority helped IUCN to design the perception survey along with a review by UNICEF. Administration of the survey was done at national and district levels by IUCN and staff of the Central Environment Authority (CEA) Natural Resource Management Unit and Environment and Education Officers of CEA in districts. Out of the sample size of 200 the respondent amount was 196. Composition of the participants were mostly from the State Sector over 18 years (employed) with 2:1 male to female ration. They had a range of backgrounds in terms of water sources they use, environment conditions of the areas they reside and the way they see how the agencies are functioning etc. Participants answered a broad set of questions that are related to health, surface water, ground water, use efficiency of water, roles of agencies, effect of partnerships, water quality and quantity related monitoring etc.

Findings of the perception survey confirmed the need of a multi-sector multi-stakeholder strategy and action plan to manage and conserve the Kelani River Basin including catchments. Although the participants are mostly from a high intellect group the understanding of the health and pollution linkages, knowledge of the factors impacting surface and ground water, environmental processes behind climate, soils, water etc. were not optimal, indicating an extensive awareness and education effort during the Kelani River Basin programmes.

Participants endorsed the value of surface and ground water monitoring and land use approaches to reduce pollution of water. They also highlighted the need for alternative sources of water and better technique to improve the use efficiency of National Water Supply and Drainage Board (NWSDB) provided treated water primarily meant for drinking. Use of treated water for washing and gardening need alternatives.

The findings also indicated the need to select sample populations, number of participants and design of strategic questions during the formal perception survey to come. In addition, the results supported the establishment of an expert group to design the survey and oversee the training and administration. Use of a uniform team everywhere in perception surveys with proper training on the overall objectives of the project (KRMP approach) and expectation of questions is also proposed in the conclusion.

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## Water safety in Kelani River Basin – A preliminary perception survey

### 1.0. Introduction

Kelani River that drains an area about 2,300 square kilometres is the primary source of drinking water to millions of people in Greater Colombo. The river basin is rich with biodiversity and natural resources. While more than 25% of Sri Lankans live within the basin the Kelani River Ecosystem supports, power generation, recreation, mineral resources harvesting, tourism and most importantly the livelihoods provided by over 10,000 industries and business. Key socio-economic sectors, therefore, include agriculture, mining, urban/rural development, industrial development, tourism, power generation, among other things.

Deteriorating water quality and emerging quantity issues in the Kelani River Basin require urgent attention. Presently the National Water Supply and Drainage Board (NWSDB) provide treated drinking water from the source water from Kelani River. Ensuring source water quality and quantity require a catchment protection approach (WHO, 2011).

Between November 2013 and December 2015 an extensive stakeholder engagement involving more than 50 different groups (Govt., Non-Govt., Community, University, Media, Private Sector etc.) helped to design and integrated strategy and action plan to ***“balance conservation needs to provide safe drinking water while ensuring the stability of the socio-economic base”*** in the Kelani River Basin. The objective was to minimize adverse human actions that cause pollution of water resources, primarily through industrial, urban, agricultural and infrastructure sectors. The mandate for the action plan was derived from the National Policy on Protection and Conservation of Water Sources, their Catchments and Reservations through the Gazette no.1894/3 dated 22/12/14 by the Ministry of Land and Land Development.

The consultative process led to the development of the ***“Medium to Long-term Multi-Stakeholder Strategy and Action Plan to Manage and Conserve Kelani River Basin”*** that consisted of over 60 activities under five Management Objective Areas. This strategy and action plan also proposed a number of detailed perception surveys starting with the inception and continuing during the implementation of the action plan, covering multiple target groups. It was decided to carry out a preliminary perception survey at the outset.

The purpose of this preliminary perception survey, using a limited cross section of stakeholders, was to:

1. Obtain a general understanding of the views of selected stakeholders on general water quality and quality issues including the health linkages to water quality
2. Identify logistical and survey administration approaches that may need additional attention during the formal perception surveys to be planned and conducted during the implementation phase of the action plan
3. Receive inputs to validate the strategic approach for the project including communication plan and school centered educational approach

## **2.0. Kelani River Basin**

### **2.1. Water quantity related information**

Kelani River Basin starts near Adams Peak which is located about 2,200 meters above mean sea level and drains to Indian Ocean by the City of Colombo. The river basin experiences an annual average rainfall about 3,450 mm corresponding to a volume of about 7,860 million cubic meters (MCM) out of which nearly 43% discharges into the Indian Ocean (Survey Department of Sri Lanka, 2007). Climate Change may add more water to this system while the water needs for drinking, environmental services and others from Kelani River also increase continuously. For example, the recently proposed Western Region Megapolis Planning approach is expected to increase the population receiving water for drinking and domestic uses, significantly by 2030. In addition, the variations of the per capita water consumption in future may dependent on the use of household appliances (both ways), extent of water recycling and reuse, rain water harvesting and the effectiveness of water and energy conservation best practices used.

### **2.2. Water Quality Issues**

The consultative sessions conducted with stakeholder groups concluded that the key pollution issues to be addressed in the Kelani River Basin are:

1. Industrial Discharges
2. Poor land use practices leading to river bank erosion and sedimentation
3. Over extraction of water, sand and gems
4. In adequate consideration of socio economic benefits of ecosystem services in planning
5. Unauthorized solid and liquid waste releases to land and water bodies
6. In efficient handling of electronics, unused medicine and post-consumer waste
7. Unauthorized constructions and encroaching river banks
8. Deforestation and forest degradation
9. Haphazard disposal of sewerage
10. Lack of disaster preparedness approaches to manage accidents

## **3.0. Methodology**

### **3.1. Approach**

The preliminary perception survey was designed by the project team (IUCN and CEA) with the inputs from Ministry of Health and administrated by the project team with the support of Environment and Education Officers of Central Environment Authority (CEA). A questionnaire format used covers different subject areas related to water (Annexure 1). The original sample size was 200 participants comprising of a cross section of stakeholders covering staff of National Agencies, staff at District, Divisional Secretary and Grama Niladhari Divisions (field). The type of different stakeholder groups selected (Table 01). Out of the 200 selected participants 196 responded.

### 3.2. Composition of the stakeholders

**Table 1: Selected Stakeholder Categories covered in the perception survey**

Stakeholder category	No.
Government (State sector) stakeholders at National level	30
Professionals (Engineers, Geologists, Sociologists, Researchers, Land use planners, Environmentalists, etc)	20
UN and International Agencies	3
Non-Government Organizations	3
Industries	3
Community Based Organizations	7
Provincial Council Secretaries and Local Authority members	14
Public Health Inspectors	14
Medical Officers of Health Services	7
District Secretariats	3
Divisional Secretariats	7
Administrative Grama Niladharies at Divisional Secretariats	7
Grama Niladharies at field level	21
Divisional Environment Officers	7
District Education Officers	7
Community members	13
School principals	7
Teacher in Charge of CEA led Environment Pioneers	7
Environment Pioneers	14
Media focal points	2
	196

### 3.3. Administration of survey

The Preliminary Perception Survey was administered at the national level as well as at local level. The national level administration took place during one of the stakeholder consultative sessions held at the Hector Kobbakaduwa Agrarian Research and Training Institute (HARTI), Colombo 07, on September 2015, where key national agencies and international agencies participated. The local level survey administration was carried out by the Divisional Environment and District Education Officers of CEA with the guidance from CEA and IUCN project team.

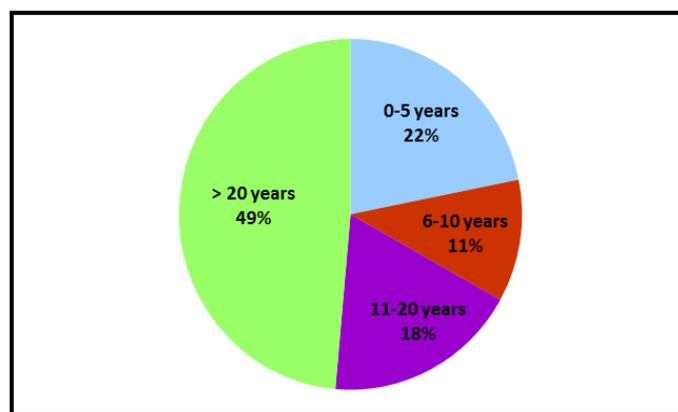
Data compilation and analysis mostly used a Microsoft Excel spreadsheet as the survey design did not involve extensive statistical analysis. During the interpretation of information in addition to the graphics the statements and comments provided through the questionnaire by the respondents were used.

## 4.0. Participant Characteristics

### 4.1. Gender

Distribution of the 196 survey participants indicated a 2:1 ratio between men and women with 66% men and 34% women, respectively.

### 4.2. Exposure to Kelani River Basin environment



**Figure 1: Years lived in the Kelani River Basin**

Close to half (49%) of the respondents have been living in the Kelani River Basin for more than 20 years. Another 29% have lived in the basin for over five years. Therefore, majority of the participants have had substantial exposure to the Kelani River Basin environment making their observations relevant and rich.

### 4.3. Age

It is important to note that all the respondents were over 18 years as a result of the selected group is within the employed category. It is difficult to articulate the exact nature of different group. However, a number of general inferences can be made.

Over two thirds of the respondents in the age group 36 years to 55 years are in an age group who lived through the issues and probably keen in ensuring a better water quality in the Kelani River for them and their future generations. The other age group between 19-36 are the young group, probably interested in a transformational change not only in the Kelani River Basin water quality but also the way environment goods are managed in the country. This group may be more oriented towards the use of Information Communication Technology tool too. The group over 55 years may have seen the Kelani River health degrading gradually and experienced in handling the politics associated with development.

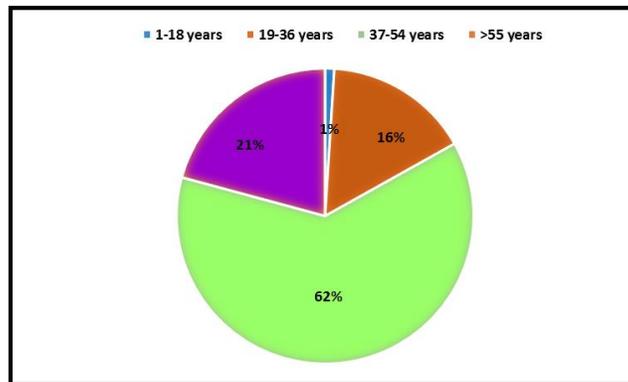


Figure 2: Age category of respondents

#### 4.4. Rural vs Urban distribution

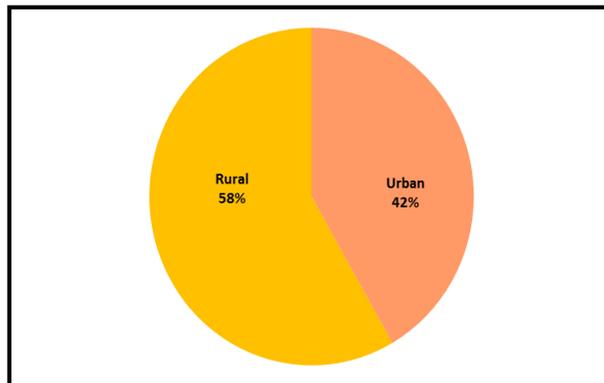
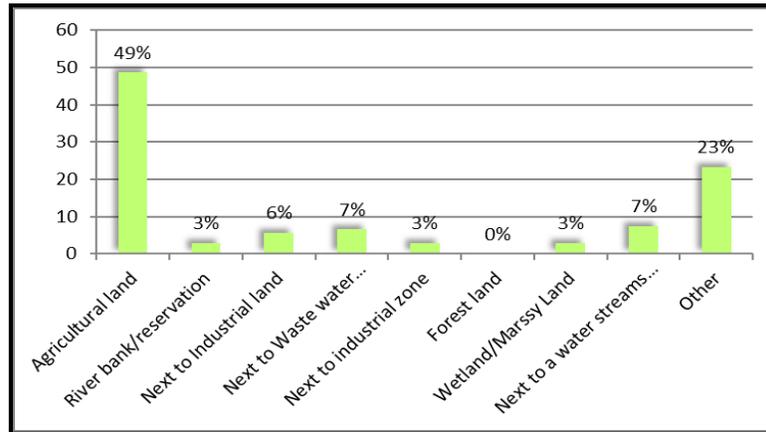


Figure 3: Urban and Rural Segregation of Participants

More participants (58%) are from rural areas (Figure. 03) with a good representation from urban areas (42%) as well, making the survey inputs more balanced in terms of rural vs urban issues, in general. There are possibilities that some of the respondents identified themselves with urban background could have had a rural exposure in the past and vice-versa in a limited way, considering the weak trend urbanization.

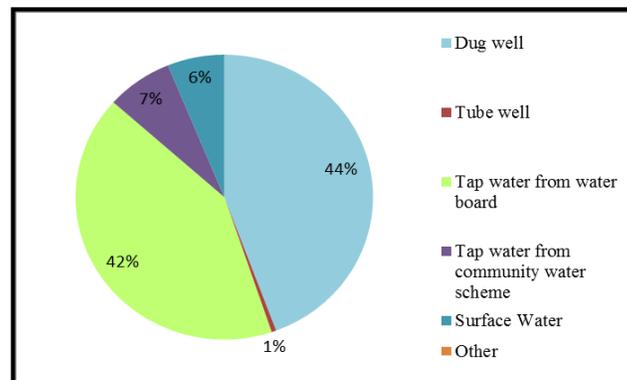
#### 4.5. Dwelling environment



**Figure 4: Immediate dwelling environment of participants**

Nearly half of the respondents (49%) live next to an agricultural land. Interestingly, the second highest (23%) group of respondents were not able to identify themselves with any of the specified categories, probably indicating the high level of land fragmentation and the small land parcels they live in the middle of mixed developments. At the same time there are a number of respondents living next to sensitive areas, namely, the river banks, wetlands and streams and there are others living near potentially unhealthy surroundings experiencing the impact of pollution as those living near industrial lands and wastewater. Hence the respondents have had a range of exposures in terms of the place they live.

#### 4.6. Drinking water source



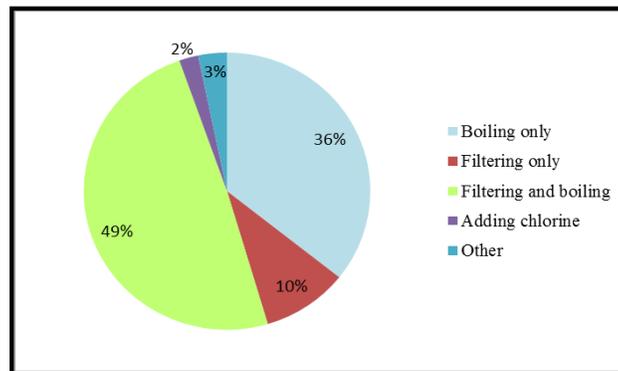
**Figure 5: Drinking water source**

It is noteworthy that majority (44%) use dug wells and water is consumed without a primary treatment with boiling (section 4.7 indicate over 85% boil water). This high dependency on shallow ground water (tapped through dug wells) could lead to situations with drinking water being contaminated by bacteria (toilets) or

chemicals or animal waste from the surface due to the minimal separation between ground surface and the water table. Luckily proper boiling can address the pathogens but other chemicals are going to be present in the drinking water.

Second highest category of respondents (42%) uses water from National Water Supply and Drainage Board (NWSDB) where conventional water treatment is applied, but impacted by the pollutants not removed during the conventional treatment. Most of the water for this group is obtained from the Kelani River.

#### 4.7. Water purification practices used



**Figure 6: Water purification practices by respondents**

Majority of the respondents (49%) filter (to remove sediments) and boil water (kill pathogens) before consuming. Boiling is the practice used by another large group (36%) probably they feel the water is clear and filtration is not needed. Therefore, about 85% of participants ensure that they at least boil water to address potential threats from pathogens that helps to avoid the contaminations due to leaking toilets and livestock waste. The 10% of the respondents who only filter water are not probably aware of the harmful effects of pathogens, yet are concerned of the safety of water as indicated by the interest on filtering.

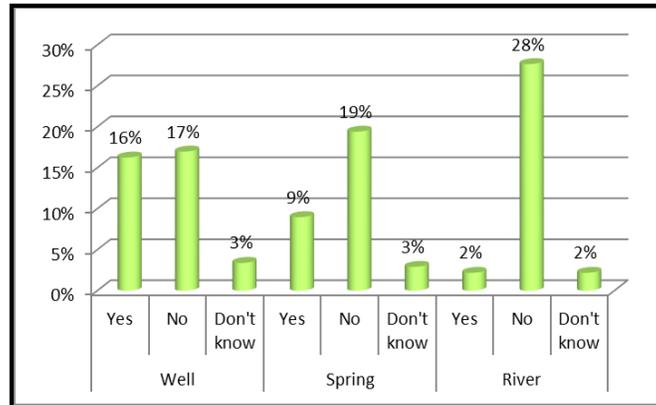
## 5.0. Results

As highlighted the purpose of this pilot perception survey, in addition to getting an idea of the knowledge level of participants, the results are expected to provide inputs to the targeted communications required during the KRMP implementation and other educational and awareness activities.

### 5.1. Perception of water quality

#### 5.1.1. Source of water and safety

Perception of the respondents on the source of water for drinking (well, spring or river) without primary treatment provided a number of useful information to plan the education, awareness and training related to the implementation of the proposed plan for the Kelani River Basin.



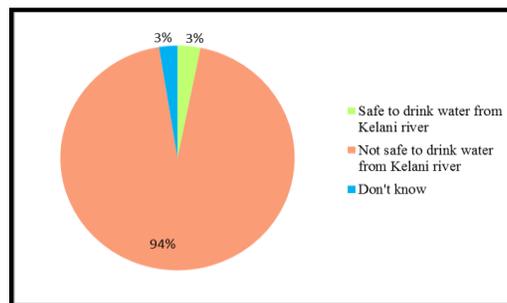
**Figure 7: Source of water and understanding on safety**

Majority of respondents (64%) believed that it is not safe to drink water directly from the river (28%), spring (19%) or well (17%) indicating a significant high level of awareness. But the high remainder (36%) highlights the need for detailed information on water safety for certain segments. Given that our participants belong to a higher intellect group, this remainder may increase at low intellect levels, possibly including the communities.

With compared to the sources of water, nearly half of respondents perceived that well water is safe to drink, whereas they indicated that it is risky to drink spring water (19% of total respondents vs 9% of total respondents). It was a clear no on the safety in the case of drinking water from river, directly.

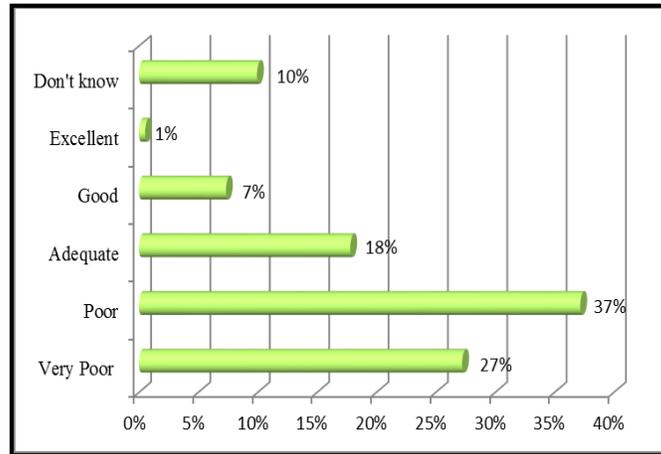
Although the general level of awareness on water safety is good form this overall response, considering the level of intellectual ability of our sample, there may be a need to provide process based knowledge on how water is being polluted and the types of purification possible etc., while proving a higher emphasis on pollution prevention. For example, when a respondent group indicates that the water is safe to drink directly, it may reflect a lack of knowledge on pathogens and pollutants possibly present in water.

### 5.1.2. Kelani River Water



**Figure 8: Kelani River water safety concerns**

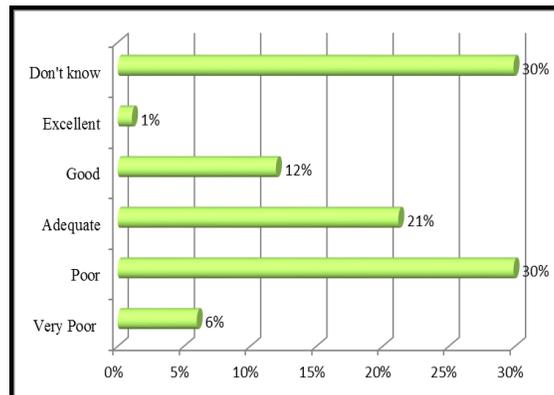
Majority of the respondents (94%) believed that it is not safe to drink water from Kelani River (Figure 8). Further the respondents expressed their views on the level of quality of Kelani River water (Figure 9).



**Figure 9: Surface water quality in Kelani River**

More than half (54%) responded indicating either water quality is poor or very poor and another 10% indicated that they are not certain (do not know). Only 26% of the respondents had some confidence (excellent, good and adequate) of the water quality of the Kelani River indicating the depth of mistrust on the quality of water for drinking. The observations in Figures 9 justifies the need for a longer-term intervention to clean up the river while addressing pollution sources.

### 5.1.3. Ground water quality



**Figure 10: Ground water quality related perceptions**

This area is extremely interesting as it starts with the fact that about 30% participants indicated that they have less ideas about the ground water quality. On the other hand over 36% indicated the ground water quality either as poor or very poor. The balance 34% (excellent, good and adequate) believed that the ground water quality is not a major issue in the Kelani River Basin.

These observations demand high level of education and awareness on ground water in general and the factors causing ground water pollution etc. In addition, it may be necessary to implement a strong ground water quality monitoring system to provide detailed information on the pollution levels and type of pollution.

#### 5.1.4. Reasons for poor water quality

Responding to the questions the participants highlighted the factors contributing to the poor water quality in broader terms along with a number of views. The key points are:

- Kelani River is contaminated with industrial chemicals discharges, agriculture chemicals (pesticides, fertilizer etc.), waste from hotels and restaurants and domestic waste.
- Water pollution in the Kelani River may cause poor human health due to water borne diseases
- Water cannot be consumed without treatment due to potential adverse health impacts
- Industrial zone and factory related pollution were evident and confirmed by the recent incidents where industry paid compensation for polluting the Kelani River.
- Poor water quality in water intake points cited but exact pollutants in water are not known.
- Faecal pollution in the river is due to diverting toilet waste to the river and discharges during floods.
- Water treatment facilities for drinking water do not remove all chemicals and the wastewater treatment plants are not functioning properly.

## 5.2. Water quantity

### 5.2.1. Overall water quantity/availability

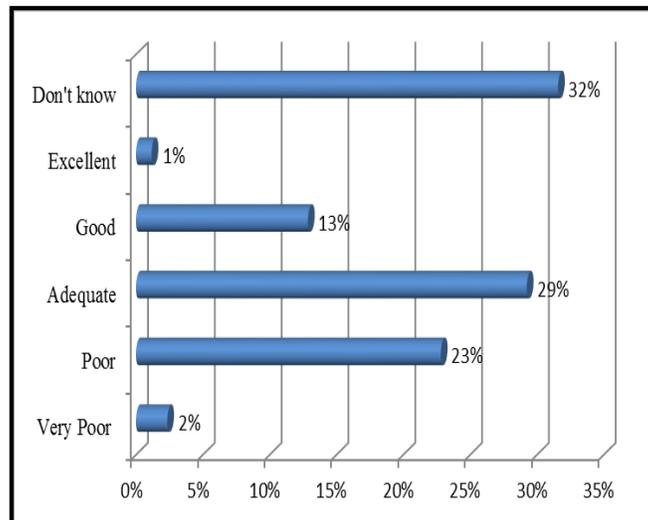


Figure 11: Overall water quantity related perceptions

On the overall water quantity or availability of water for use, 32% of the group responded as “don’t know” which is somewhat challenging as it indicates a significant knowledge gap in terms of understanding the availability of water.

The awareness, education and communication programmes of KRMP approach can make use of this observation and develop material on the factors affecting the overall water budget that takes into account the water inputs (rainfall), discharges, ground water recharge, crop uses and other uses. The same will help to promote water use best practices to improve the efficiency of water use as well as capturing water at the surface level (rain water).

Further 25% (poor and very poor together) indicates that the overall water quantity is inadequate to meet the demands as they perceive. 43% of the respondents do not see a major issue in terms of quantity issues in general.

In practice the only time the water availability is question in the Kelani River Basin is low flow periods where sea water travel upstream up to about Ambathale water treatment facility. In those periods the NWSDB constructs a salinity barrier (sand bags) below the water treatment plant. There are proposals to invest on an automated balloon type salinity barrier and also create a number of reservoirs upstream to hold water to release during dry spells. Climate change prediction for Kelani River is more rain or an increase in water availability in the basin area (Punyawardena et. al., 2013).

### 5.2.2. Ground water availability

Understanding stakeholder’s perception on quantity of ground water is also important in terms of creating a culture of water safety as the quantity of ground water is linked to the availability of water as most of the participants and the basin dwellers use dug wells (shallow ground water).

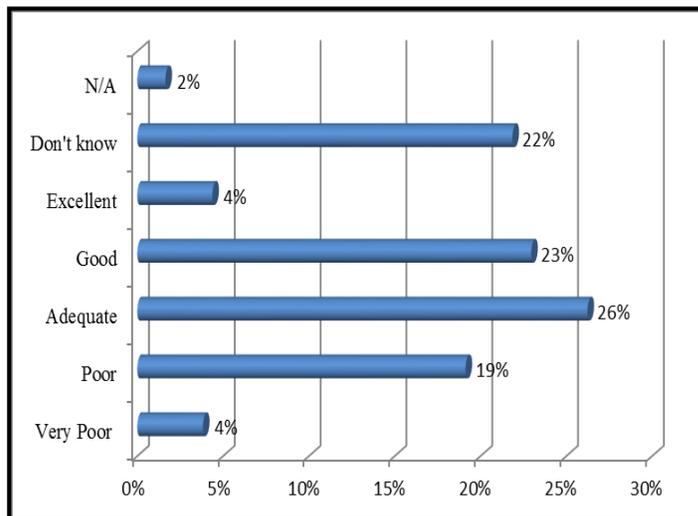


Figure 12: Ground water quantity related views

Most of the participants indicated that there are no major issues related to the quantity of ground water in the Kelani River to meet the demands. For example, the total responses of excellent, good and adequate groups was 53%. However, another 23% responded indicating negative on the quantity or the availability of ground water is poor and very poor. It is known that certain areas in Gampaha and Colombo Districts the dug-wells do not yield water during dry seasons, especially when the irrigation systems in the area are also dry. This observation provide room to improve water use efficiency in the Kelani River Basin area and adopt programmes to increase infiltration of rain water to ground plus enhanced rainwater harvesting practices.

Interestingly about 22% responded under don't know category that indicated the need for awareness and education on factors determining the quantity of ground water in the Kelani River Basin. In general, the ground water is an area that is less explored in the Kelani River basin yet an important area to focus, both in terms of pollution potential and the quantity of water.

There are a number of plans to study the ground water in the Kelani River Basin by Water Resources Board (WRB) and the proposal is attached to the main report body. In addition, University of Sri Jayawardenapura is engaged in an extensive ground water related work in the Kelani River Basin.

### 5.3. Agency responsibility towards water resources

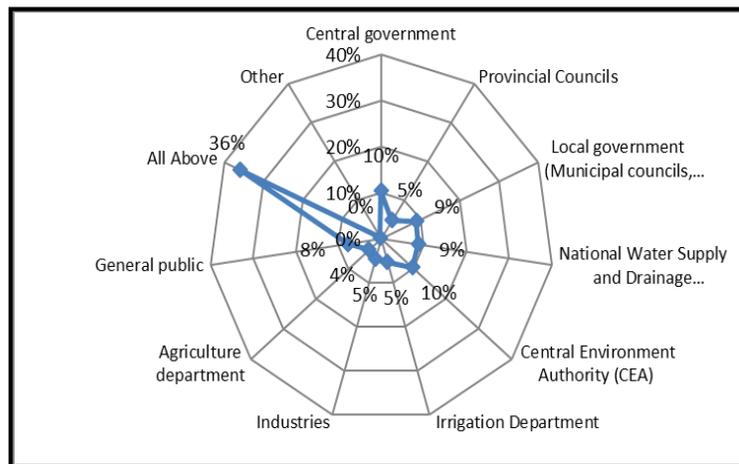


Figure 13: Responsibility on surface and ground water

About 36% of respondents believed that multiple parties are responsible for various aspects of water resource management (quantity and quality) management including Central Government, Provincial Councils, Local governments (Municipal Councils, Urban Councils and Pradeshiya Sabhas), CEA, NWSDB, Irrigation Department, Industries, Agriculture Department, General Public and other relevant stakeholders. At the same time none of the individual entities has been identified as “solely” responsible for the overall management of water resources by more than 5% of the respondents. This observation again highlighted and validated the assumption of a multi-

stakeholder approach for the management and conservation of Kelani River Basin water resources and to address water quality and quantity issues.

Going a bit deeper in the analysis, the participants have identified CEA, NWSDB and Local Government entities as more responsible for water related responsibilities. This may indicate the high expectation on key mandated areas such as enforcement and environment management of industries by CEA, water treatment responsibilities of NWSDB and service delivery areas such as waste management plus industry approvals by local authorities.

On the other hand, it is interesting to note that the participants have not highlighted the Provincial Councils as a key responsible entity, probably indicating a missing link in their knowledge on the important role that the Provincial Councils and the systems can play. Finally, the participants also identified general public also has a responsible party, which points towards the possibilities for increased participation and empowerment of general public, individually or collectively with appropriate knowledge, technologies and resources to carry out the responsibly of protection and management of water resources by public.

#### 5.4. Respondent trust on agency performance

Different responding groups (Table 1) exhibited differences in the way the groups perceived the performance of responsible agencies in addressing water issues of the Kelani River Basin.

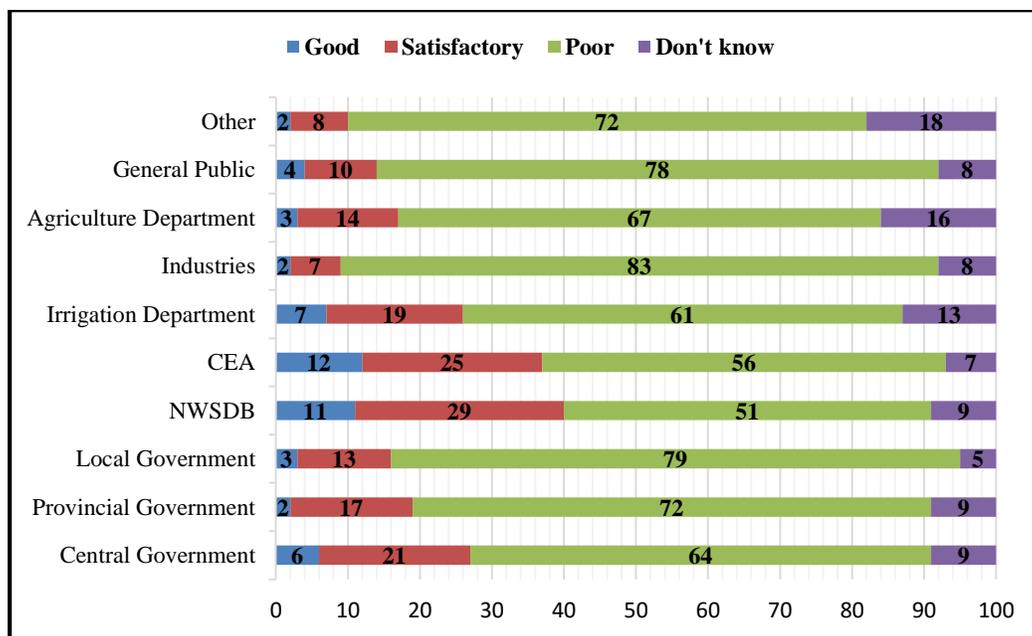


Figure 14: Respondent groups and perceptions

Generally, none of the agencies got a high rating from the respondents on trust. This observation indicates room for improvement by agencies on what they do and the need to tell what the agencies are doing so that others appreciate and recognize their contributions, as this lower rating could be partly attributed to the lack of knowledge by participants on agency work. The roles different agencies play in the Kelani River Basin management and conservations were identified in stakeholder consultations and articulated in CEA (2016).

This also indicates the need for extensive capacity development of agencies and improved coordination among agencies so that the confidence level among agencies and within public increase and due recognition is noted.

Somewhat high satisfaction was expressed towards CEA, NWSDB and ID. However, it is not prudent to use this limited data to compare between agencies but sufficient to conclude that the KRMP plan implementation requires all agencies build their capacity and take the responsibility to deliver the programme towards safe drinking water with the expectation that future perception surveys will deliver improved confidence ratings. At the same time the communication strategy need to help the agencies by describing the inputs, highlighting the good work and recognizing the champions within agencies.

## 5.5. Land use planning

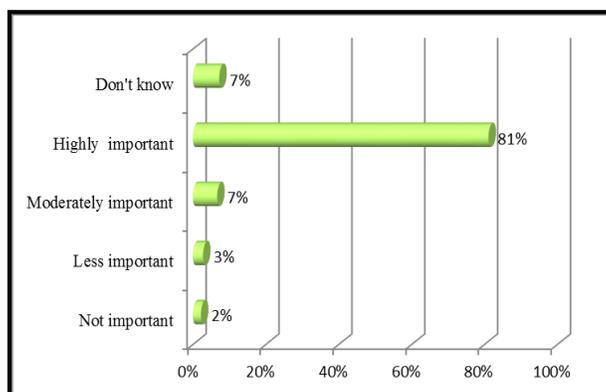


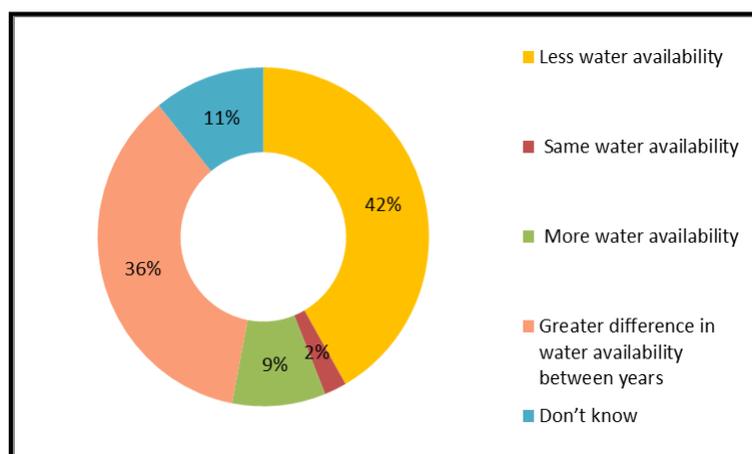
Figure 15: Importance of land use sector

There are a number of key sectors important in the management and conservation of the Kelani River Basin, namely, land use, industry, urban and infrastructure. Out of the sectors the land use sector is the most complex involving policy and best practices. Although complex a significantly high percentage (81%) of respondents recognized the importance of land use sector for future interventions. It is even high (88%) when the moderate component is added. This observation confirms the need for the accelerated adoption of the National Policy on Protection and Conservation of Water Sources, their Catchments and Reservations led by Ministry of Land and Land Development.

It is also important to recognize that 7% of the participants failed to note the importance of the land use sector for water quality improvement, indicating the room for awareness and education,

especially connecting the relationships of poor land use, environment degradation and water quality and quantity issues.

## 5.6. Climate change impacts



**Figure 16: Climate change related potential impacts**

On the potential Climate Change impacts only 2% indicated no change in water availability implying a pending change. About 42% of the participants believed that less water will be available in the Kelani River Basin in future as a result of climate change while 36% indicated a high variability in water availability.

This observation clearly indicates a lack of knowledge on key research findings among non-researchers (assuming the participants are not formal researchers). For example, the Punyawardena et. al. (2013) indicated an increased availability of water as a result of climate change in the wet zone where Kelani River Basin is located. However, the Dept. of Agriculture data already indicate a high variability in the rainfall pattern across the country which is very much in line with the observations by 36% of the participants on variability on water. The fact that about 11% of participants marking “don’t know” may mean that the participants are not adequately clear about the water-soil-climate processes.

These observations provide major inputs to the KRMP approach and its communication work such as the need to propagate research information to public and also promote knowledge on hydrology, climate and other related subjects to public in a simplified way to improve the understanding.

### 5.7. Water quality monitoring

Almost all respondents were in agreement towards the importance of monitoring the water (quantity and quality) in both ground and surface water. Over 70% recognized the value of monitoring with insignificant differences between quality and quantity. This observation justify the investment and attention for monitoring adopted in the KRMP design.

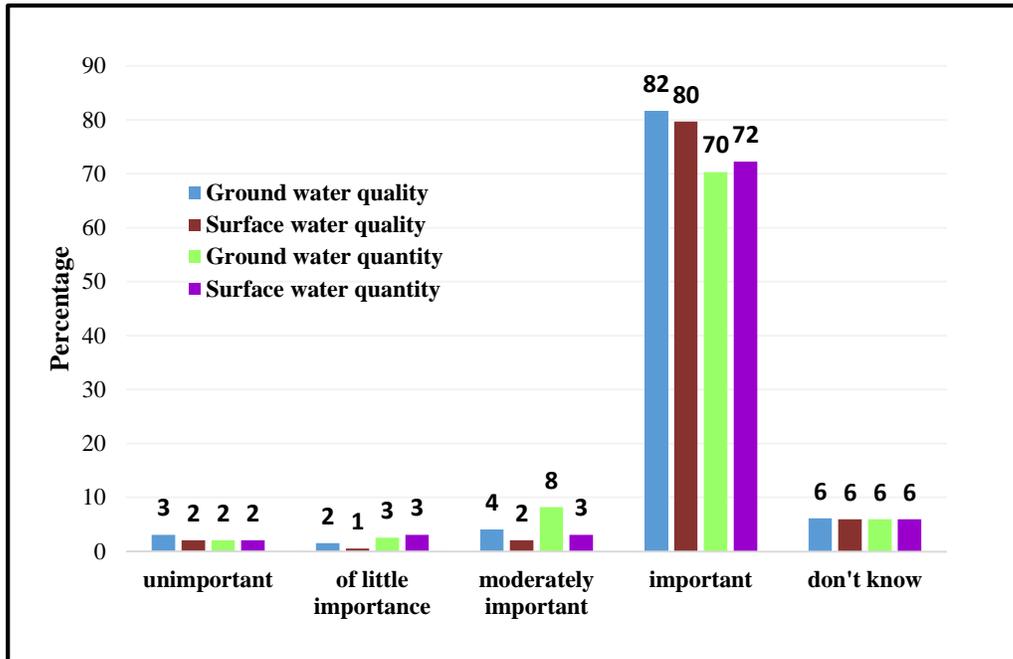


Figure 17: Water quality monitoring

### 5.9. Usage of treated water

Treated water for drinking is costly and the use of drinking water for other domestic and industrial purposes are considered as a less efficient use of treated water supplied by National Water Supply and Drainage Board (NWSDB).

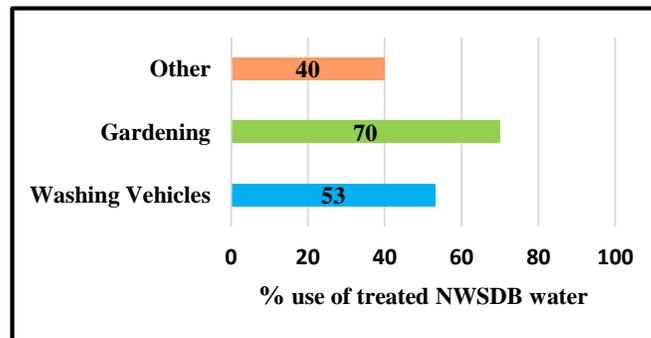
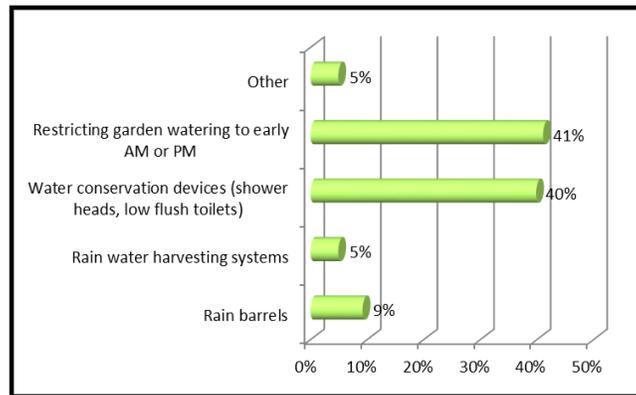


Figure 18: Use of pipe borne water

About 70% of the participants use NWSDB supplied portable water for gardening and 53% use the NWSDB water for washing vehicles. These observations highlighted the reality on the ground, primarily at household level, due to the lack of alternative sources of water for gardening, vehicle washing and other non-drinking purposes. There are a number of ways to improve this situation by encouraging and providing enabling environment and incentives for recycling water (ed or rainwater) for gardening, vehicle washing. These inefficient portable water uses allow room to promote best practices during the project implementation and also to strengthen the communications, awareness and education components of the project.

### 5.10. Water conservation options



**Figure 19: Water conservation options**

In order to save water used for gardening survey respondents (41%) suggested to water during early morning or late evening, when the evaporation of applied water is less. Another 40% proposed to use water conservation devices such as controlled shower heads, low flush toilets, and other technologies to save the water. Only 5% proposed rainwater harvesting as a water conservation option, probably due to the lack of knowledge on the possible range of rainwater harvesting techniques. These multiple ways of rainwater harvesting can be promoted along with other water use efficiency techniques in rural and urban settings through the communication, awareness, pilots, education etc. of the Kelani River Multi-Stakeholder Partnership approach.

### 5.11. Health Aspects of water pollution

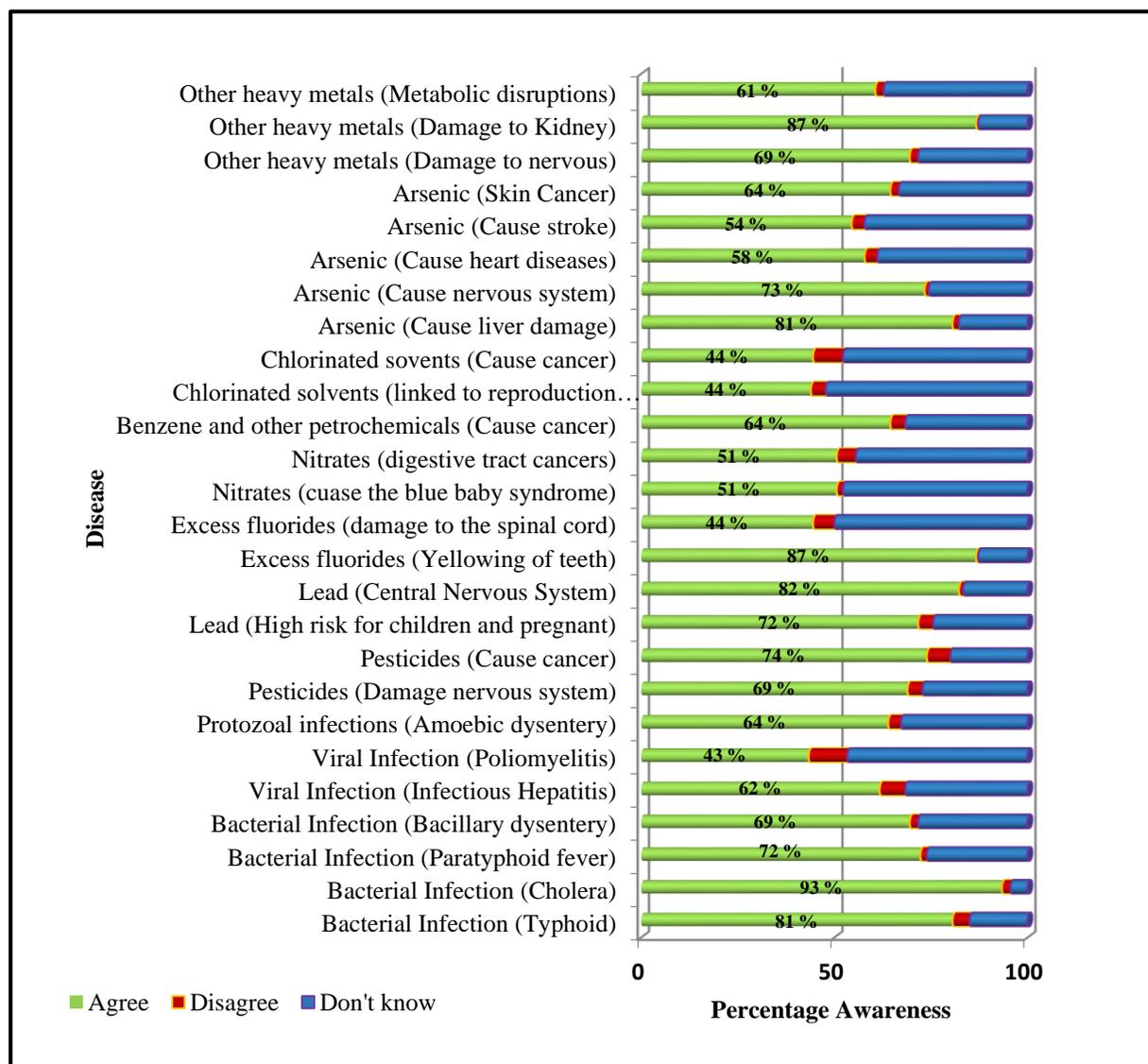


Figure 20: Linkage between water quality and water borne diseases

There are a number of human health issues linked with water pollution. Some diseases are immediately evident after consuming poor quality water, such as stomach pains, vomiting etc. However, most critical are the diseases that do not show immediate symptoms but have a slow-onset. The negative results of consuming polluted water are known after learning of health problems later such as kidney related issues, cancer etc. During the perception survey the respondent indicated their level of knowledge on the water quality linkages with a set of health issues. The list of diseases commonly used by the Health Department was used in the questionnaire for this part of the survey.

For the 26 diseases used in the list over 60% respondents identified 18 diseases as having a connection between the disease and water quality. At the same time in the case of 22 diseases more than 20%

respondents indicated that they are not sure or do not know whether there is a connection exist between the water quality and disease. In both counts more education and awareness are required in KRMP approach.

There is a clear indication that where there are propaganda or national debate on diseases or issues the participants were aware of the connection between health problems and diseases. For example, there are a number of TV advertisements on fluoride and yellowing of teeth which was reflected in the survey with over 80% respondents agreeing that there is a connection of high fluorides in water and yellowing of teeth. Similarly, the connections between bacteria, typhoid and cholera had been very clear with over or nearly 80% respondents making the connection. Part of the credit of the latter response also should goes to Sri Lanka health authorities of their intensive health campaigns especially using village level health professionals.

However, in the cases where the issues less discussed and known such as excess fluorides damaging spinal code or chlorinated solvents causing cancer and affecting reproductive health, over 40% respondents did not make the health and disease connection. The above two observations highlight the possibilities of using an expanded dialogue and use of media to promote knowledge and best practices.

On the other hand, it was surprising why the candidates did not make the connection (only 51%) between nitrites and blue baby syndrome as it is a commonly discussed disease in the country, probably due to the word Nitrates. If it was indicated as fertilizer the answer would have been different. Although the sample used is from the high intellect group some of the facts require detailed explanations, an inference that can be used in future surveys, especially considering the range of intellect groups KRMP activities are targeted.

These responses were particularly helpful to understand the efforts needed in awareness and education particularly using the health related professionals at basin and minor watershed (local levels). In general, most respondents believed and agreed that there are health impacts of water pollution. This is a good entry point for promoting the need to manage chemicals and other disease causing material including industrial discharges, agriculture pollution, septic tanks and sewerage plus to invest on them by industries and local authorities.

Also it highlights the need for a multi-sector multi-stakeholder engagement combining health, land use, industry, local service delivery, environment enforcement etc. to minimize the health impacts of pollution.

## **6.0. Limitations and lessons learnt**

This preliminary perception survey, as indicated in the objectives, is a limited effort to better understand the logistical needs required and the approach to be taken during the formal perception surveys to come during the KRMP approach implementation. At the same time the main focus of the project was to develop the Strategy and Action Plans, therefore, the attention and resources used in this preliminary perception survey had been somewhat limited. However, the process helped the KRMP design team to learn and observe a number of aspects important to consider in the future, hence, the investment went into this perception survey is fully justified.

The lessons learnt is divided into two categories in the following discussion.

1. Perception survey design related experience
2. Survey administration, logistics and capacity development related experience

### **6.1. Selection of groups, sample size in the design**

In this preliminary survey a number of short cuts were used to capture the respondents, such as a national level consultative meeting for Government Agencies etc. It restricted the process of obtaining a balanced set of group as well as adequate representation from a single group.

In a formal perception survey, it is necessary to define the different stakeholder groups and the number of samples from each group clearly (e.g. national agencies, non-Govt. agencies at central and grass root levels, local authorities, district administration at different levels, public at different levels, school children etc.) and allocate resources to reach the full group.

In the KRMP approach the first design will come at the very inception during the baseline setting phase. The questions to be used in the perception survey need to be covering multiple areas related to the five management objectives of the strategy and action plan.

Depth of the questionnaire used in the preliminary survey was kept limited due to the limited time and ability to train the survey administration team. During next stages the survey questions needs to be more comprehensive and geared towards supporting the implementation of the KRMP approach. As the Kelani River Basin proposed activities cover a range of subjects with some subjects are more technically complex it may be challenging to design the questions in a way that most of the respondents are comfortable in answering. This may require high level of expertise in designing and simplifying.

It is of paramount importance to engage a number of professionals from the very outset in the design covering different subject categories. For example starting with statistical designing the areas of expertise may extend to ecology, economics, social sciences, engineering, health, community mobilization, disaster risk management, local government etc. This multi-disciplinary group need to design the survey with the support of the statistical knowledge so that the analysis and interpretation will be in line with KRMP approach and support the Monitoring and Evaluation plus communications. There could be situations the questions may lead to more confusion that is harmful to the process, therefore, a number of trials are needed during the designing phase.

### **6.2. Capacity of the survey administrators**

For this preliminary perception survey staff of CEA in the Districts, Divisional Secretariats and Grama Niladhari Divisions were used including Divisional Environment Officers and District Education Officers. They did well given the time, resources and capacity available with them during the survey. It was found that this set of officers are a good selection to be in the formal perception surveys too.

However, as the formal perception surveys are broader and include more technical and social angles, the team may have to be expanded to provide the necessary capacity. A good strategy to select the team of administrators may be to use the design team composition and get the design team to identify the representatives to be in the administration team.

It is fundamental that the formal surveys use the same administration team all the time and the team is well trained and familiar with not only of the overall project but also what is expected in each question in the survey format. As such the team needs to be provided with adequate training and facilities plus the guidance during perception surveys. This strategy will not only build the team knowledge but also impart the sense of ownership towards the activities of the KRMP approach.

## **7.0. Conclusions**

Although the perception survey was preliminary and limited in scope and depth with minimal resources allocated to the task. Nevertheless, it provided a wealth of inputs towards the design of the “Medium to Long-Term Multi-Stakeholder Strategy and Action Plan for management and conservation of the Kelani River Basin” or the Kelani River Multi-Stakeholder Partnership (KRMP) approach. A number of lessons learnt are summarized below.

### **7.1. Multi-sector approach and role of agencies**

In the survey results it was evident that majority of respondents endorsed the multi-sector and multi-stakeholder approach. At the same time the observations on “agency responsibilities” and “agency effectiveness” indicated the need for improved communications to explain the agency roles and mandates towards the objectives of KRMP approach. Communication should articulate the relationships and synergy of individual and joint activities by agencies, highlight progress and accomplishments and demonstrate how well the agencies are responding to challenges in the work plan. In the process communication tools such as recognition of agency champions and promotion of successes in media etc. to enhance the appreciation by public and others on agency contributions in addressing water quality and quantity issues. This process is expected to increase the general awareness of the agency roles and also ensure a better motivation and ownership of the KRMP approach by agencies and public.

### **7.2. Health and prevention as an entry point**

Safe drinking water has a direct link to health. The preliminary survey highlighted that most participants are aware of some dangers of poor quality water by way of “boiling and filtering water” and also identified a number of links between “diseases and poor quality water.” In the broader context the results highlight the positive side of the health extensions services in the country and the potential additional reach by media tools.

At the same time the observations indicated that even the high intellect group used in this survey can use more health related information. Therefore, the communications during the KRMP have an extensive role to play. One area that was identified consistently is the process knowledge. For example, how certain diseases are initiated and root causes, possible carriers etc.

### **7.3. Education, awareness and training on processes**

During the survey a significant amount responses were in the category of “do not know” or “not sure.” This could be more prominent if the sample consisted of more low intellect groups or vice-versa. Either way it is the responsibility of the KRMP approach to ensure that the required knowledge on environmental processes, climate and others including best practices are made available to all stakeholder groups. For example, in the case of ground water it was clear that the process knowledge was missing with nearly 30% indicating do not know. In addressing this gap, it requires the KRMP to adopt an extensive, awareness, education and training process to support not only to Govt. agencies but also include other stakeholder groups including media. This is an area where Universities can play a major role. The KRMP approach has included a number of education and awareness efforts including a school led education component plus elaborated activities in the basin on globally recognized important days such as “world environment day.”

Based on the comments of participants it was evident that some issues are to be addressed at policy level and some are related to environment or water use efficiency best practices. These areas may need different modalities for awareness and build the capacity of target groups. For example, on best practices, demonstration pilots may work better and on policy work forums to bring different views, results of socio-economic studies with policy briefs and consultations may be appropriate. Therefore, the awareness, education and training needs to have a range of modalities based on the target group, issue and significance. In addition, the external factors such as climate change impacts and cross cutting areas like gender needs to be mainstreamed in all awareness, education and training efforts.

### **7.4. Link to Management Objectives of the KRMP approach**

The proposed Medium to Long-Term Multi-Stakeholder Strategy and Action Plan for the Kelani River Basin Management and Conservation was validated with this perception survey, particularly to strengthen the awareness, education and communications in line with five Management Objectives of the KRMP approach (Mallawatantri, et. al., 2016). The lessons learnt during the design and administration of this preliminary survey will certainly add value to the set of perception surveys planned at different stages of the implementation of the KRMP approach including the baseline establishment.

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Mallawatantri, A., A. Rodrigo and K. De Silva. 2016. Medium to Long-term Multi-Stakeholder Strategy and Action Plan for Management and Conservation of the Kelani River Basin, 2016-2020. Central Environmental Authority and International Union for the Conservation of Nature, Sri Lanka. 156 pp.

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Survey Department of Sri Lanka, 2007. *The National Atlas of Sri Lanka (Second Edition)*, page 63.

World Health Organization. 2011. *Guidelines for drinking water quality - 4th edition*.

## Annex 01: Perception Survey on Water Safety

Please read carefully and tick ✓ or write as instructed

### Participant Profile

1. Gender (Male/ Female)?      Male                  Female

2. How long have you lived in Kelani River Basin?

0-5 years	
6-10 years	
11-20 years	
>20 years	

3. Age

1-18 years	
19-36 years	
37-54 years	
>55 years	

4. What is your occupation (write the institution if applicable)?

5. Where do you live (if within the Kelani river basin)?

Tick and write category of the place/address from the below list as applicable

a)	Urban		Divisional secretariat	
b)	Village		Grama Niladhari division	

Agricultural land	
River bank/reservation	
Next to an industrial land	
Next to waste water disposing canal	
Next to an industrial zone	
Forest land	
Wetland/marshy land	
Next to a water stream connects with Kelani river	
Other (specify)	

### Drinking Water

6) Where does your drinking water come from?

- |  |   |
|--|---|
| <input type="radio"/> Dug well             | <input type="radio"/> Tap from community water scheme       |
| <input type="radio"/> Tube well            | <input type="radio"/> Surface water (river, stream, spring) |
| <input type="radio"/> Tap from water board | <input type="radio"/> Other (please specify)                |

- 7) Before drinking do you check if your water is good for your health?**
- Yes
  - No
  - Don't know
- 8) How do you decide if your water is safe for drinking?**
- by look, taste and smell
  - by available water quality reports
  - by environment around the water source
  - by reputation of the supplier
  - don't know
- 9) If you are supposed to decide if a water sample is drinkable, what factors would you consider?**
- Germs in water
  - Chemicals dissolved in water
  - Appearance of water
  - All above
  - Don't know
- 10) If you have a doubt of water you drink, what would you do?**
- Treat it at home
  - Don't do household treatment
  - Want to treat but don't know the best option
  - Get it tested from water board
- 11) What are the household water treatment methods you practice**
- Boiling only
  - Filtering only
  - Filtering and boiling
  - Adding chlorine
  - Other (pls explain)
- 12) As you think what are the harmful substances removed when you boil water?**
- Germs only
  - Harmful chemicals only
  - Both germs and harmful chemicals
  - Don't know
- 13) If you filter water, what is the method used?**
- Standard ceramic candle filter with stainless steel body
  - Plastic filter with both ceramic element and multiple layer element
  - Just straining with a piece of cloth
  - Other
- 14) As you think what are the harmful substances removed when you filter water with your filter method?**
- Germs only
  - Harmful chemicals only
  - Both germs and harmful chemicals
  - Don't know
- 15) If you are to select only one out of the following 2 treatment options, what will be your choice?**
- Boiling device that kills all the germs
  - Filter that removes most of the dissolved chemicals

Please explain the reasons for your choice.

**16) Do you think if it is safe to drink water directly from a well, spring or a river without treatment?**

	Well	Spring	River
Yes			
No			
Don't know			

**17) If your water is coming from piped water scheme what statements below you agree with?**

- Piped water is free of all harmful substances
- Quality of water depends on the method of treatment by supplier
- Don't know

### Drinking Water and Diseases

**18) Do you believe poor water quality impact on human health?**

Yes	
No	

**If yes, what do you think about the human health impacts due to poor water quality from the below list ?**

<i>Cause</i>	<i>Water-borne diseases/impact</i>	<i>Agree</i>	<i>Disagree</i>	<i>Don't know</i>
Bacterial infections	Typhoid			
Bacterial infections	Cholera			
Bacterial infections	Paratyphoid fever			
Bacterial infections	Bacillary dysentery			
Viral infections	Infectious Hepatitis (jaundice)			
Viral infections	Poliomyelitis			
Protozoal infections	Amoebic dysentery			
Pesticides (organophosphates and the carbonates)	Damage nervous system			
Pesticides (organophosphates and the carbonates)	Cause cancer			
Lead	Central nervous system			
Lead	High risk for children and pregnant			
Excess fluorides	Yellow the teeth			
Excess fluorides	Damage the spinal cord			
Nitrates	Cause the 'blue baby' syndrome			
Nitrates	Cause digestive tract cancers			
Benzene and other petrochemicals	Cause cancer			
Chlorinated solvents	Cause reproduction disorders			
Chlorinated solvents	Cause cancer			
Arsenic	Cause liver damage			
Arsenic	Cause nervous system damage			
Arsenic	Cause heart diseases			
Arsenic	Cause heart stroke			
Arsenic	Cause skin cancer			

<i>Cause</i>	<i>Water-borne diseases/impact</i>	<i>Agree</i>	<i>Disagree</i>	<i>Don't know</i>
Other heavy metals	Damage nervous system			
Other heavy metals	Damage kidneys			
Other heavy metals	Cause metabolic disruptions			

**Water in Kelani River**

**19) Do you think it is safe to drink water from Kelani river directly?**

- Yes
- No
- Don't know      Please explain reasons for your answer

**20) How would you rate the overall water QUALITY of Kelani river?**

very poor     poor     adequate     good     excellent     don't know

**21) How would you rate the overall QUANTITY of Kelani river for your usage?**

very poor     poor     adequate     good     excellent     don't know     N/A

**22) How would you rate the overall QUALITY of ground water in Kelani River Basin?**

very poor     poor     adequate     good     excellent     don't know

**23) How would you rate the overall QUANTITY of ground water in Kelani River Basin?**

very poor     poor     adequate     good     excellent     don't know

**24) Rank following from 1-14 where 1 is the activity with the greatest negative effect on water quality**

Irregular solid waste dumps	
Pesticide and fertilizer pollution	
Urbanization	
Industrial pollution	
Sewerage/septic discharge	
Urban wastewater	
Storm water	
Livestock rearing and access to water bodies	
Deforestation	
Land fill site	
Irrigation practices	
Development (e.g. residential, recreational)	
Sand and gem mining	
Other(specify)	

**25) Are there specific sites along the Kelani river and within the basin where you are concerned about water quality? Please name the sites**

**26) I believe that current predictions for climate change will result in the following(Pls tick ✓)**

Less water availability	
Same water availability	
More water availability	
Greater difference in water availability between years	
Don't know	

**27) What is the month with the highest rain fall in your area?**

**28) What is month with the lowest rainfall in your area?**

**29) Please list your top three concerns/ideas about water in Kelani river**

- 1
- 2
- 3

**Accountability**

**30) In your opinion who should be most responsible for ensuring water quality and quantity in the Kelani river? Tick ✓ and explain**

Central government	
Provincial government	
Local government (Municipal councils, Urban Councils, Pradeshiya Sabhas)	
National Water Supply and Drainage Board(NWSDB)	
Central Environment Authority (CEA)	
Irrigation Department	
Industries	
Agriculture department	
General public	
All Above	
Other(Specify)	

**Why?**

**31) . How do you feel each of the below groups perform in fulfilling their responsibility for protecting water quality and quantity in Kelani River? (select and tick ✓ one per row)**

	<i>Good</i>	<i>Satisfactory</i>	<i>Poor</i>	<i>don't know</i>
Central government				
Provincial government				
Local government (Municipal councils, Urban Councils, Pradeshiya Sabhas)				
National Water Supply and Drainage Board(NWSDB)				
Central Environment Authority (CEA)				
Irrigation Department				
Industries				
Agriculture department				
General public				
Other(Specify)				

**32) In your opinion how important land use(vegetation, forest cover, settlements, etc) for a healthy Kelani River Basin?**

unimportant  of little importance  moderately  important  don't know

**33) In your opinion how important do you think it is to monitor: (select one per row)**

	unimportant	of little importance	Moderately important	important	don't know
Ground water quality					
Surface water quality					
Ground water quantity					
Surface Water quantity					

### Water Conservation

**34. Do you have a groundwater well?**

Yes  No

**35. How often do you test the water quality of your ground water well?**

Annually	
2-5 years	
Never	
Other(specify)	

**36. Do you practice any of the following water conservation measures in your home? (check all that apply)**

Rain barrels	
Rain water harvesting systems	
Water conservation devices (shower heads, low flush toilets)	
Restricting garden watering to early AM or PM	
Other(specify)	

**37. Do you use Water Board (NWSDB) supplied water for followings?**

Washing vehicles	
Gardening	
Other (Specify)	

**38. Do you practice water quality improvement measures (check all that apply)**

Use of environmentally friendly cleaning products	
Safe use and disposal of pesticides/herbicides	
Safe disposal of solid and liquid waste (degradable, non. Degradable, e-waste, etc)	
Use of car wash facilities	
Other(specify)	

**39. Do you practice water safety measures in your home or institution. If not please select the top 3(THREE) barriers in the table below (b).**

a. Yes

No

b.

Lack of incentives	
Lack of resources	
Lack of knowledge	
High cost	
Time constraints	
Not personally interested	
No barriers	
Other(specify)	

**40. Please select the top 3 (THREE) ways you prefer to learn about Kelani River Basin best management and conservation practices. (Please choose only THREE and rank your choices by indicating a 1, 2 or 3 in the appropriate box, where 1 is the most appropriate)**

Technical support	
Demonstration sites	
Awareness and training	
Printed media publications (e.g.Newsletters,articles, web posts, bill boards, etc)	
Electronic media publications( TV , radio programmes, news, etc )	
One-on-one consultation	
Word of mouth (i.e. neighbour, friend)	

Other(specify)	
----------------	--

**41. Have you participated in any of the following activities: (check all that apply)**

Kelani River Basin group meetings/ activities	
Volunteer water quality monitoring	
Demonstration site visits	
Awareness, education and training programmes	

**42. Please list the top 2 water issues you personally would like to learn more!**

*“Thank you for your cooperation”*

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