

GROUNDWATER AND IWARM PART 2

Rwasoka, Donald T – drwasoka@gmail.com - 4-July-2011 @ IWSD, Zim
Presentation at the Groundwater Management for Hygiene and Sanitation Course

Outline

- Dimensions of Groundwater Management
- Key Groundwater Management Challenges
- IWRM and (Sustainable) Groundwater Management
: how can we marry the two?
- Conclusions

Dimensions of Groundwater Management

3

Managing groundwater has two important dimensions, namely:

- Hydrologic (hydrogeologic) dimension – Its about the resource – occurrence, quantity, recharge, K , S , S_y , T , modeling in all the D's...
 - ▣ supply-side management
- Socio-economic dimension – managing people and their interactions with the physical environment - land use, planning, Education and Awareness
 - ▣ demand-side management.
- Are there other dimensions? e.g. Political

Key Groundwater Management Challenges

4

1. *Supply Management Challenges*

Case of unknowns and or issues that are under or not addressed, e.g.

- Susceptibilities of aquifers to negative impacts under abstraction stress
- SW-GW interactions:
 - abstraction effects on river baseflows and wetlands
 - recharge reduction effects due to surface-water modification
- Vulnerability of GW to increased climate variability and change is unknown for most systems in Southern Africa

2. Demand Management Challenges

5

- social development goals – food production – that influence groundwater use are NOT effectively addressed because they do not promote cross-sector coordination.
- regulatory interventions – water rights/permits – and economic tools – abstraction tariffs – are not effectively enforced or are difficult to enforce

2. Demand management Challenges (contd.)

6

- There is no balance between government's capacity to enforce regulatory provisions, and user capacity to comply with the provisions.

The challenges lead us to:

IWRM and
(Sustainable) Groundwater
Management :
how can we marry the two ?



Why should we marry the two?

- (Sustainable) groundwater management has been pursued for a long time
- IWRM is a relatively recent framework or concept
- In fact, the **I** in **IWRM** is the new element
- The **I** seeks to **integrate**:
 - ▣ Surface and Groundwater Management
 - ▣ Quantity and Quality
 - ▣ Land and Water Management
 - ▣ Green, Blue, and Grey Water Management
 - ▣ Human – Physical Environment Interactions
 - ▣ Cross-sectoral planning - across Ministries, Depts , Civic Society with Water Users
- ‘Traditional’ sustainable groundwater management and IWRM are not antagonistic but mutually reinforcing!!!

Why should we marry the two: Regional Overview?

TABLE 1
Summary of groundwater dependency in the SADC Region

Member State	Rural	Urban	Agriculture	Industry	Overall dependency
Angola	**	**	**	*	**
Botswana	***	**	***	***	***
D R Congo	*	*	*	*	*
Lesotho	**	**	*	*	*
Malawi	***	*	**	*	**
Mauritius	**	**	**	**	**
Mozambique	**	**	*	*	**
Namibia	***	***	***	***	***
Seychelles	**	**	*	*	*
South Africa	***	**	**	**	**
Swaziland	***	*	**	*	**
Tanzania	***	**	**	*	**
Zambia	**	**	*	**	**
Zimbabwe	***	**	***	**	***

*Scale *** major, ** moderate, * minor Adjusted from Wellfield Consulting Services & British Geological Survey, 2003*

- Source: Eberhard Braune and Yongxin Xu (2008)

Why should we marry the two: Local Context?

10

- Increased groundwater demand by the general public
- Competing demands – GW 4 Agric, UIM, Env't
- Current approaches are not sustainable
- Demands for better groundwater resource accountability
- Environmental needs
- Increased vulnerability of the resource
- Deteriorating quality vs. even stricter restrictions
- Climate change and/or increased climate vulnerability
- The need to sustain short-term benefits of today vs. the long term resource mgt goals
- *And the supply and demand side challenges highlighted earlier*

A key strategy to mainstream groundwater management is to use the IWRM framework or change areas!!!

And some of the windows of opportunity could be?

Enabling Environment

- How does national legislation define water?
 - ▣ In SA until the National Water Act of 98, GW was defined as Private Water
 - ▣ In Zim until the Water Act of 98, GW issues were silent but the Water Act of 98 recognizes water as one entity – surface and ground
 - Sect 3. Water is a national ‘good’
 - Sect 4. No private ownership of water

- How do we finance groundwater management?
 - ▣ As it seems groundwater management as service is difficult to conceptualise for most stakeholders

Institutional Roles

- The adoption or incorporation of IWRM in most countries has been facilitated water sector reforms
- The reforms, most often than not, have been accompanied by ‘new’ institutions for e.g.

Institutions	Country
Catchment Councils, Subcatchment Councils & The Zimbabwe National Water Authority	Zimbabwe
Catchment Management Agencies, DWAF	South Africa
Basin Management Committees , DWAF	Namibia

Institutional Roles (2)

- Does the institutional framework:
 - ▣ articulate management of water at the lowest appropriate level ?
 - ▣ How do we engage the water users at the theatre level so that they understand that accessing groundwater is just not another private investment ?
- Roles, responsibilities and boundaries
 - ▣ What are the roles and responsibilities of river basin organisations in groundwater management ?
 - ▣ How do we optimise the definition of these elements amongst the key institutions ?
 - ▣ For example: What role does a national apex body play on the day-to-day management of boreholes in rural communities ? Is it the most appropriate institution for local scale groundwater regulation issues ?
 - ▣ How do we engage non-state actors in groundwater management ?
- Capacity building

Management Instruments

- Water Resource Assessments
 - ▣ Are the groundwater assessments detailed enough?
 - ▣ Do we have groundwater management plans?
 - ▣ Are SW-GW interactions well understood?
 - ▣ Recharge and vulnerability assessments
 - ▣ Modeling

Management Instruments (2)

- Planning
 - ▣ IWRM planning, opportunities for mainstreaming groundwater issues
 - ▣ Cross-sectoral planning

- Social change instruments
 - ▣ Through curricula
 - ▣ Education and Awareness

Management Instruments (3)

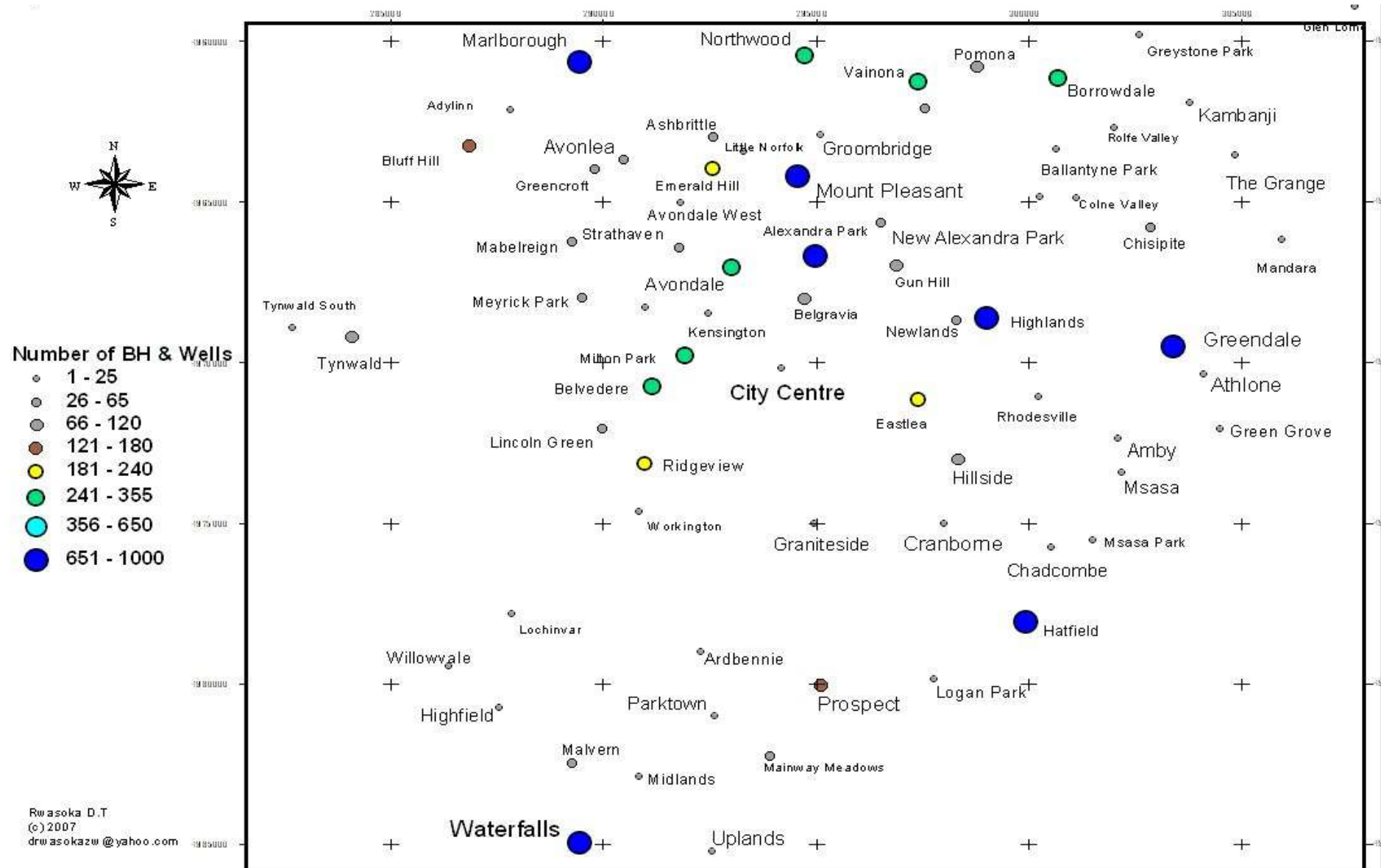
- Regulatory instruments – allocation and water use limits.
 - ▣ Do regulatory instruments reflect the key groundwater issues or concerns?
 - ▣ Are the regulatory instruments flexible enough to allow for reallocation, when the need arises?
 - ▣ Are they ‘rights’ or ‘permits’?
 - In Zimbabwe the term ‘right’ led to problems as it was interpreted as an irrevocable right and therefore implementation of management options such as re-allocation became challenging – Now Permits are issued
 - ▣ Are the water use limits being guided by water resource assessments

Management Instruments (4)

- Economic instruments – using value and prices for efficiency and equity
 - ▣ Value vs. pricing – are they the same?
 - ▣ Also, Financial Instruments – Levies

- Decision support systems for IWRM
 - ▣ Modeling, GIS and Remote Sensing for the basics and the complicated stuff
 - ▣ Helps communicate and build consensus
 - ▣ See examples - next slides

Spatial Distribution of Boreholes and Wells of Selected Residential Areas in Harare.



- (source - Rwasoka :2007)
- As of the 2011, the number of known boreholes has more then doubled

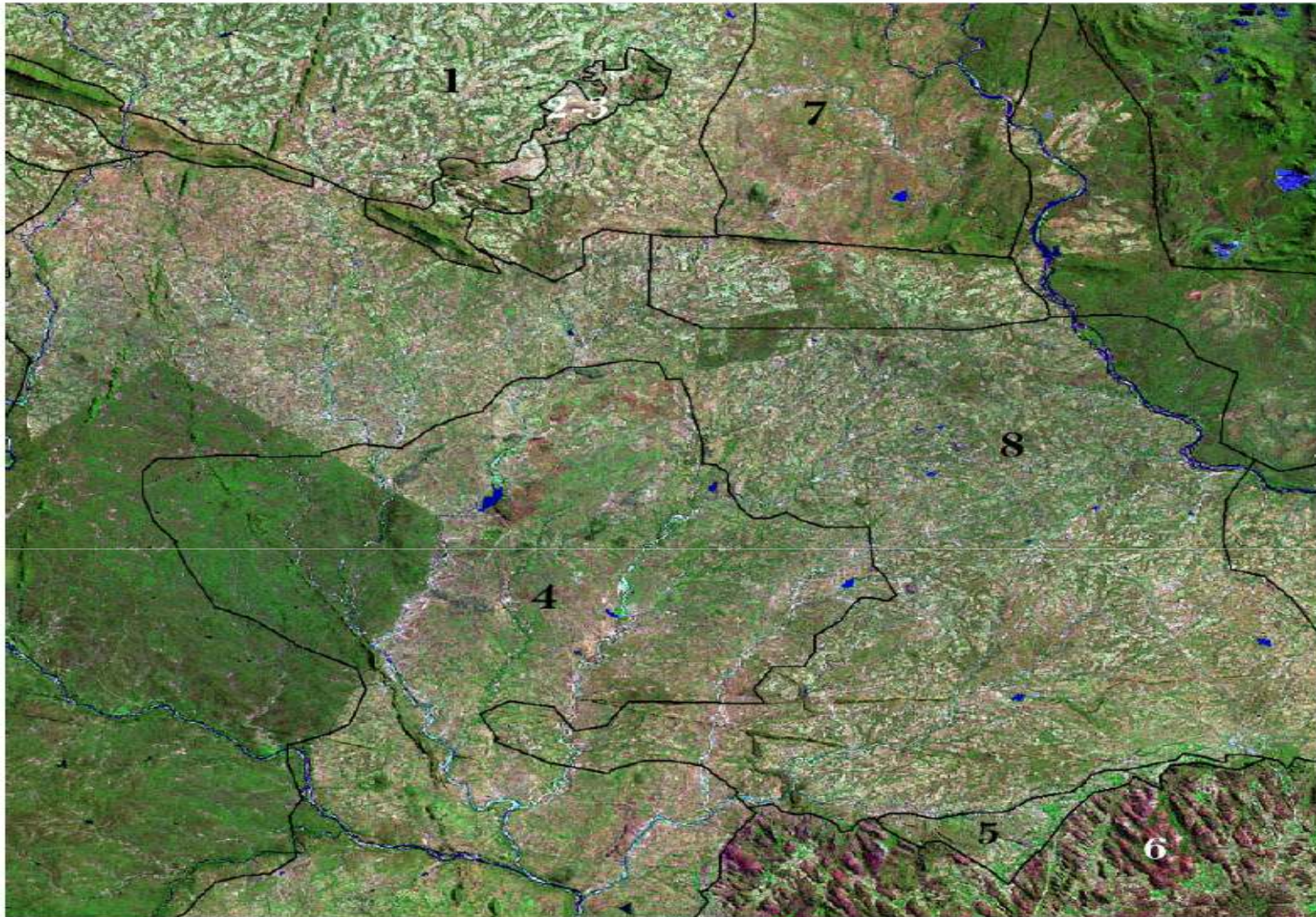
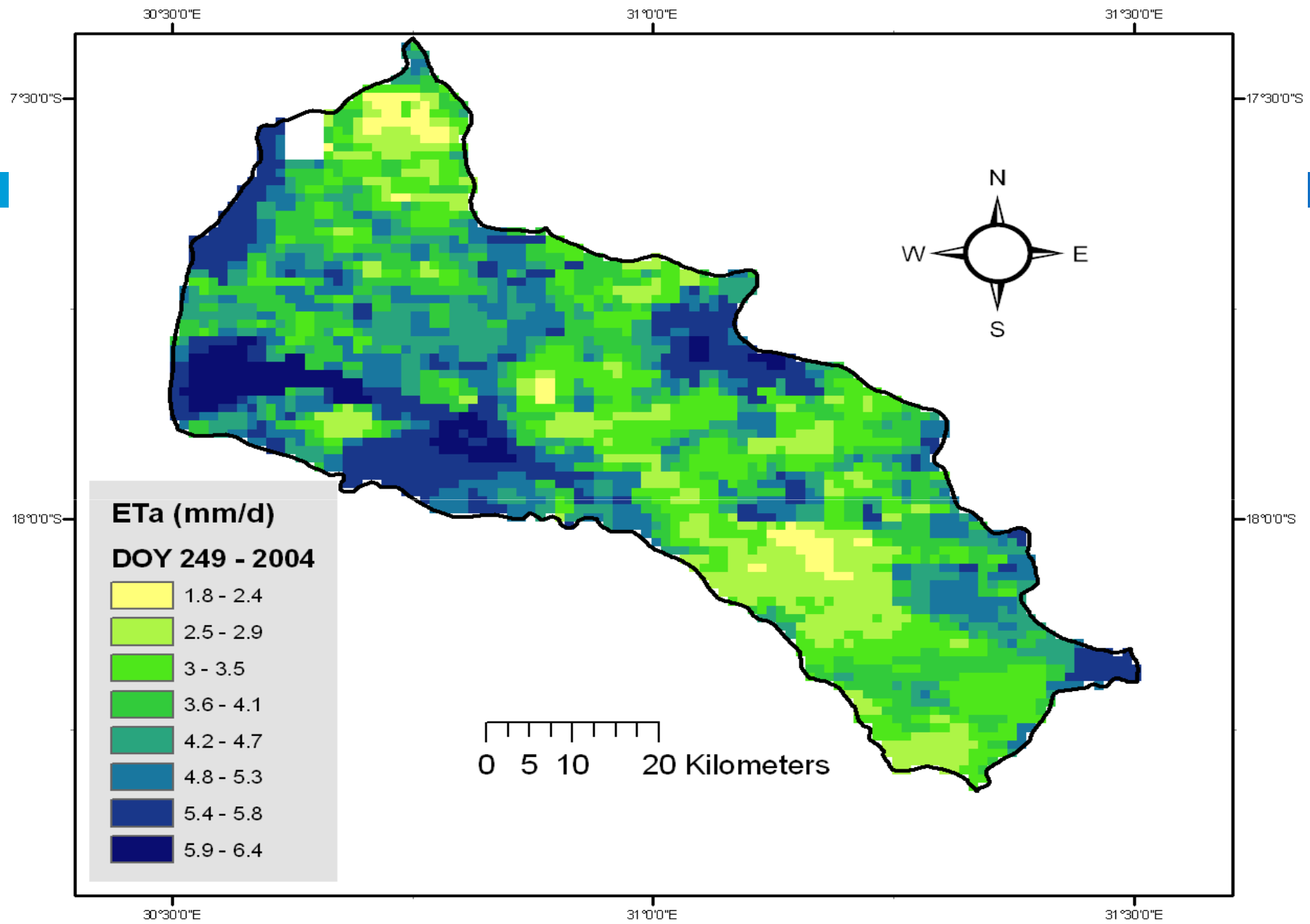


Figure 10-1 Hydrogeomorphological units of granite/gneiss area in SE Zimbabwe, differentiated on the basis of patterns and local relief. Numbers refer to units shown in more detail in Figure 10.2. Landsat TM false colour of bands 5, 4 and 2, all with edge enhancement. Distance E-W is 40 km.

(Source - Meijerink *et al* : 2007)



(Source:- Rwasoka: 2010) – Such data can be used in estimating recharge and running distributed models

HOW CAN IWRM BE USED TO
FURTHER THE GROUNDWATER
MANAGEMENT AND/OR
GROUNDWATER FOR HEALTH
AND HYGIENE IN YOUR LOCAL
CONTEXT?

Key Conclusions

- 'Traditional' sustainable groundwater management and IWRM are not antagonistic but mutually reinforcing
- There is need for water sector players to address the supply and demand side challenges
- Traditional ideals and goals of sustainable groundwater management can be accommodated and supported by IWRM
- IWRM is an opportunity to bring together all stakeholders in the management and development of groundwater

THANK YOU!!