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CHALLENGES AND OPPORTUNITIES TO ADVANCE HYDROLOGY IN SA

From an education perspective

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BACKGROUND



- The future is characterized by uncertainty, linked to global change & increased complexities.
- The traditional training & tool kit of hydrologists will be insufficient.
- Growing need for universities to train dynamic hydrologists
 - capable of developing an understanding of the complexities of the whole hydrological system and the individual components
 - able to work in an interdisciplinary framework.
- These training requirements are even more pressing in the southern African region – both in number & skills.

To develop a generation of hydrologists equipped with the skills to address these complexities and problems, postgraduate training becomes critical.

To grow postgraduate numbers & to improve the preparedness of postgrad candidates, the undergraduate programme is crucial.

CHALLENGES UNIVERSITY EDUCATORS ARE FACING ... 1

General challenges [Eng. & Science]

- Preparedness of students entering universities
 - Maths & English
- Class sizes & continually growing numbers – change in methods
 - For eg: 2nd yr Hydro class @ UKZN – 56 in 2012; 67 in 2013; 83 in 2014
- Facilities & resources
 - Teaching venues & postgrad office space
 - For eg.: UKZN – campus where Hydro taught only two venues accommodate classes of 85+ (all life, earth & agri sciences taught on same campus)
 - Laboratory space & computing resources (Undergrad & Postgrad)
 - Tutors & demonstrators
 - Declining library budgets
- Social dynamics in classes & prior knowledge

CHALLENGES UNIVERSITY EDUCATORS ARE FACING ... 2

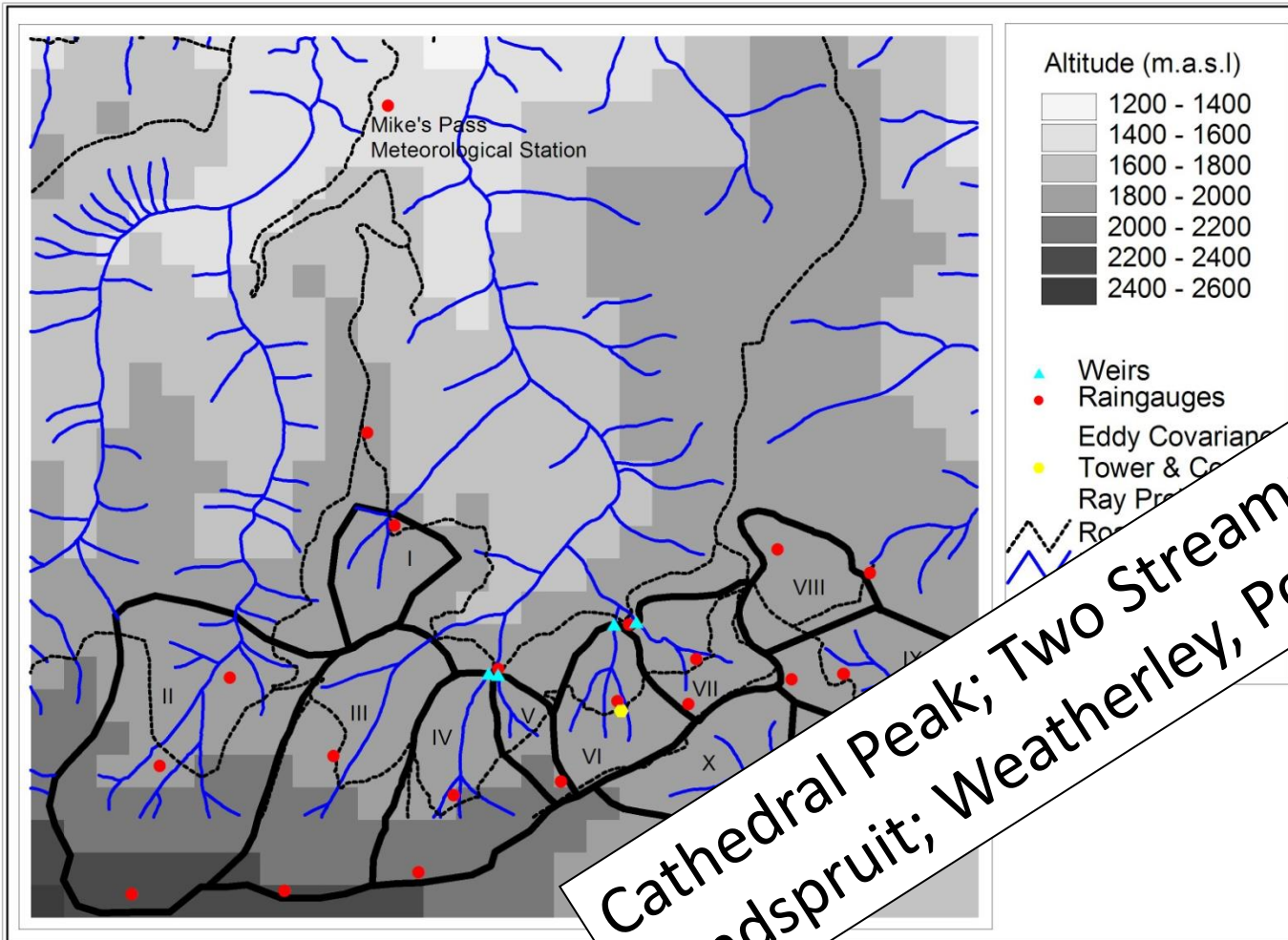
Challenges facing Hydro & Water related programmes

- University funded staff - limited numbers
 - E.g. Universities with Undergrad programmes:
 - UKZN: 5 posts; 1 vacant (Prof Hydro); 1 with PhD.
 - Univ. Venda: 4 posts; 3 with PhDs (according to website).
 - UniZulu: 4 posts; 1 appointed as Vice-Dean; 1 advertised; 1 vacant (??).
 - Supervision capacity
- Varied syllabi & inadequate access to updated teaching materials
- Lack of exposure to scientific method and rigor
- Limited pool of well prepared postgrad candidates & many believe better to study outside of SA
- STUDENT FUNDING (Bursaries, conference support etc)
- Push towards a 1 yr MSc (Academic yr vs Hydrological yr)
- Declining observation networks (lack readily available data)

OPPORTUNITIES

- Growing class sizes
 - Recognition of hydrology as discipline/career
 - Larger pool of undergrads to draw from.
 - More opportunities for Postgrads to become involved in tutoring & teaching (often 2 way learning experience).
- Using externally funded staff to teach & supervise.
- Shared teaching material – e.g. MOCHA
- E-learning tools – e.g. online learning platforms
- Involving Honours students in funded research projects
 - Greater exposure to scientific method & rigor
 - Part of a team
 - Found more likely to continue on to MSc

LIVING LABORATORIES



LIVING LABORATORIES FOR UNDERGRAD AND POSTGRAD STUDENT TRAINING

- Conceptualization; learning through experience & visualization – visually explicit teaching
- Hands-on practical training & intensive field schools – student centred approach, learning by doing, discovery learning.
- Return to process based studies
- Pooling of expertise & resources (human & capital).
- Postgrads working on individual projects aimed at solving an overarching research question.

LOOKING FORWARD

- Are current undergrad & postgrad programmes adequate (content & method) to train required hydrologists?
 - Is there need for a common core at undergrad level?
 - Little research exists surrounding hydrology education
 - A critical need for a solid grounding, with higher levels skills
 - Apple core educational concept
 - T-shaped competency profile
- Value of living laboratories
 - Long term monitoring & data [value of SAEON & links between]
 - Research & training – process based and beyond
- Need to retain researchers (& teaching staff) & students
 - Need for long-term funded research “chairs”?
 - Competitive & attractive student packages