60 second interview | *Eugene Cloete*

Prof. Eugene Cloete, MSc, DSc
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Prof. Eugene Cloete, MSc, DSc is the Chairman of the School of Biological Sciences and Head of the Microbiology Department at the University of Pretoria, South Africa. His main research focus is water microbiology; under his supervision is a research task team which has developed a strategic alliance with the Council for Scientific and Industrial Research – this has helped to make Pretoria a hub for water research in South Africa.

Having completed his academic training, Professor Cloete worked in the private sector for several years at a company which manufactured biocides in the water cooling industry. He then joined the University of Pretoria in 1986, whilst retaining his strong connections to the private sector. These connections have proven beneficial in recent years primarily by providing a source of funding for research programmes and in ensuring alignment of research with industry needs. His background led Professor Cloete to specialise in the industrial water sector, with a keen interest in biofilm development and monitoring.

He joined IWA in 1980, whilst completing his PhD thesis (a study of the workings of biological phosphate removal in activated sludge) and realised that IWA represented not only a home for his research work, but an opportunity to access an international platform and interact with other leading edge researchers in the water research field.

- *What do you consider to be the most significant recent change in your field of expertise to have occurred in the last 10 years?*

  The development of molecular techniques has been one of the most important advances in biological phosphate removal in activated sludge. This has allowed the study of population dynamics in the subject, making a huge difference in scientific understanding of microbial ecology and therefore the modelling of activated sludge.

  In terms of biofilm research, the development of a multi-disciplinary approach over the last ten years has been very significant. This paradigm shift followed the general realisation within the academic community that no single scientist – however competent – possessed the necessary skills set and expertise to cover all aspects of the subject.

  A third focus area has been the pace of change in describing the growth and formation of biofilms through modelling and imaging techniques, made significantly easier by the development of laboratorial micro-sensors.

- *What do you consider to be the most significant future challenge that professionals must deal with in the next 10 years?*

  In terms of wastewater treatment, there needs to be a paradigm shift away from water borne sewerage to alternative forms of dry sanitation; a potentially huge task. If we fail in this task and we continue our love affair with water borne sewerage, we will need to change in how we think about municipal effluent. It is a valued resource, not a waste product; it provides phosphate, carbon and nitrogen to be used in gardens and as fertiliser in agriculture. Additionally, by changing our mindset about wastewater, we can stimulate economic development in countries like South Africa, where wastewater systems are not always operated optimally. If waste can be turned into something of economic value and clean water is produced as a by-product, there will be a major impact on the development of economies.

  A significant challenge remains in biofilm monitoring to implement an on-line, non-destructive system once water has been treated. This is especially the case where water is transferred long distances after treatment, as in South Africa (transfer distance can rise up to 250 km). The next challenge would be to control these biofilms once they are in-situ.

- *Whom do you consider to be the leading experts in your field, outside of your own organization, and why?*
    - Dr Brenda Little, USA
    - Dr. Wolfgang Sand, Gemany
    - Professor Zbigniew Lewandowski, USA
    - Professor Hans-Curt Flemming, Germany
    - Professor Hector A. Videla , ARGENTINA
    - Professor Iwona B Beech, United Kingdom
    - Professor Paul L Bishop, USA
    - Dr William McCoy, USA
    - Professor Thomas Neu, Germany
    - Professor Per Halkjaer Nielsen, Denmark

    These individuals have a distinctive interest in the field; many are engineers and have dealt with the practical aspects of designing, modelling, building and researching within their subject. The significance of their contribution comes from their passion and curiosity, but also an enjoyment in seeing their research translate into practical policy.

- *Which report, product or service from your organization deserves more attention and why?*
    In 1986, it was common belief that bacteria would not develop resistance to biocides because they adopt a multiple target attack approach, unlike antibiotics which use a single structure within the cell to target bacteria.

    This dogma prompted my research interest in inducing resistance in micro-organisms, and making use of non-oxidising biocides. I started exploring the mechanisms behind this process, and the culmination of the research was publication of an academic refereed journal article. This subsequently became one of the journal's most cited and downloaded articles, as it challenged the previously conceived paradigm of bacterial resistance to biocides and illustrated the significance and potential magnitude of the problem. Multiple drug resistance is a huge headache and the water industry has to be careful not to contribute to this problem.

- *In what ways would you like to see IWA change in the next 5 years?*
    IWA can fulfil its promise by delivering on two fronts, firstly the ways in which the Association can service the expectations of members and, secondly, making a difference in water resource management issues worldwide. To fulfil these two elements, IWA must understand member's expectations and mobilise its expertise, so the Association becomes an even more significant contributor worldwide.

    I would like to see the introduction of a series of colloquiums, where we take a given topic (for example water in arid regions) and then invite 20 people from across our specialist groups to meet during the course of a week to discuss the issue and produce a report. The outcome from these meetings will be a published status report on that particular subject that would help the sector understand where we were at that given moment in time. These colloquiums, and the outputs from them, will be recognized as the seminal future challenges and will give researchers guidance on emerging issues and trends, so as to focus funding proposals.

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