Water Science

Graduation Ceremonoy
Master Course

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Motivation for establishment of the curriculum „Water Science“

- Usable (!) water becomes more and more scarce because it is wasted, contaminated or wrongly used, and it is increasingly polluted by „natural disasters“ or even more scarce due to extended droughts
- Most freshwater is consumed for irrigation in order to provide sufficient food – frequently, the quantity is not sufficient and the water is polluted
- Drinking water: Quality crucial for health
- Technologies to purify waste water and to treat raw water for drinking purposes are all well known – but avoiding contamination is most effective
- In developed countries: optimization in terms of quality and costs
- Human Right to Water: Billions of humans have no access to clean water nor to sanitary facilities – they have the right to be provided with those
- At the University of Duisburg-Essen, comprehensive knowledge and experience are at hand to train „water intelligence“ – ZWU as a platform
- Establishment of a (once visionary) interdisciplinary and international curriculum „Water Science“
  - ⇨ Bachelor Course „Water Science“ since 2001 (in German)
  - ⇨ Master Course „Water Science“ since 2002

What is taught in „Water Science“?

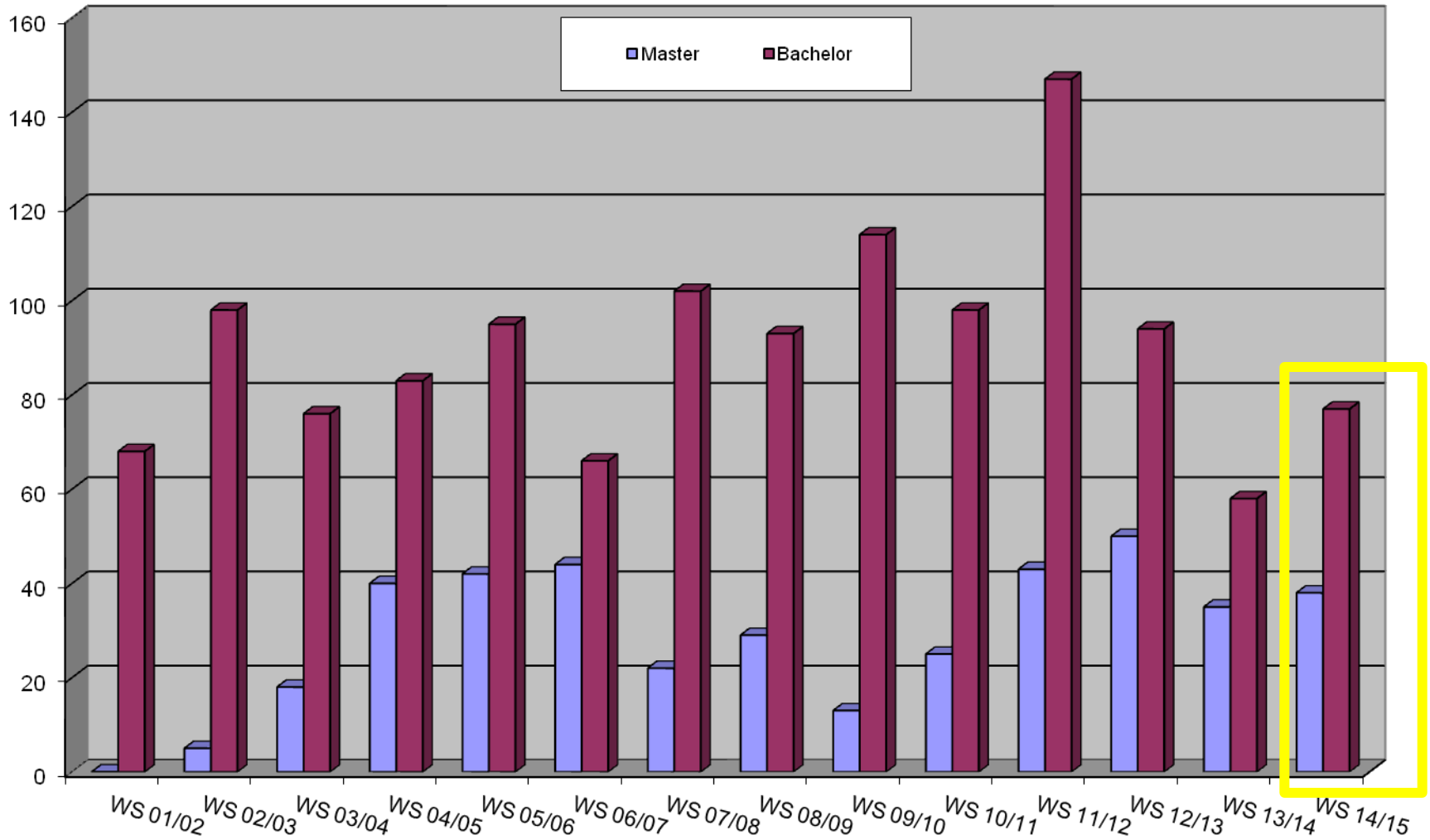
- Fundamentals of most important natural and engineering principles for understanding properties of all kinds of waters and the processes happening
- Practical skills and knowledge for chemical, analytical and microbiological understanding and treatment of waters – the practicals are considered very important in the curriculum
- Knowledge of hygienical, toxicological and legislative aspects of water
- Aspects of management and and economics
- Implentation of awareness on the global relevance of the responsible handling of water
- Language ability in both courses

Result: Internationally acknowledged degrees in Water Science, world-wide working possibilities

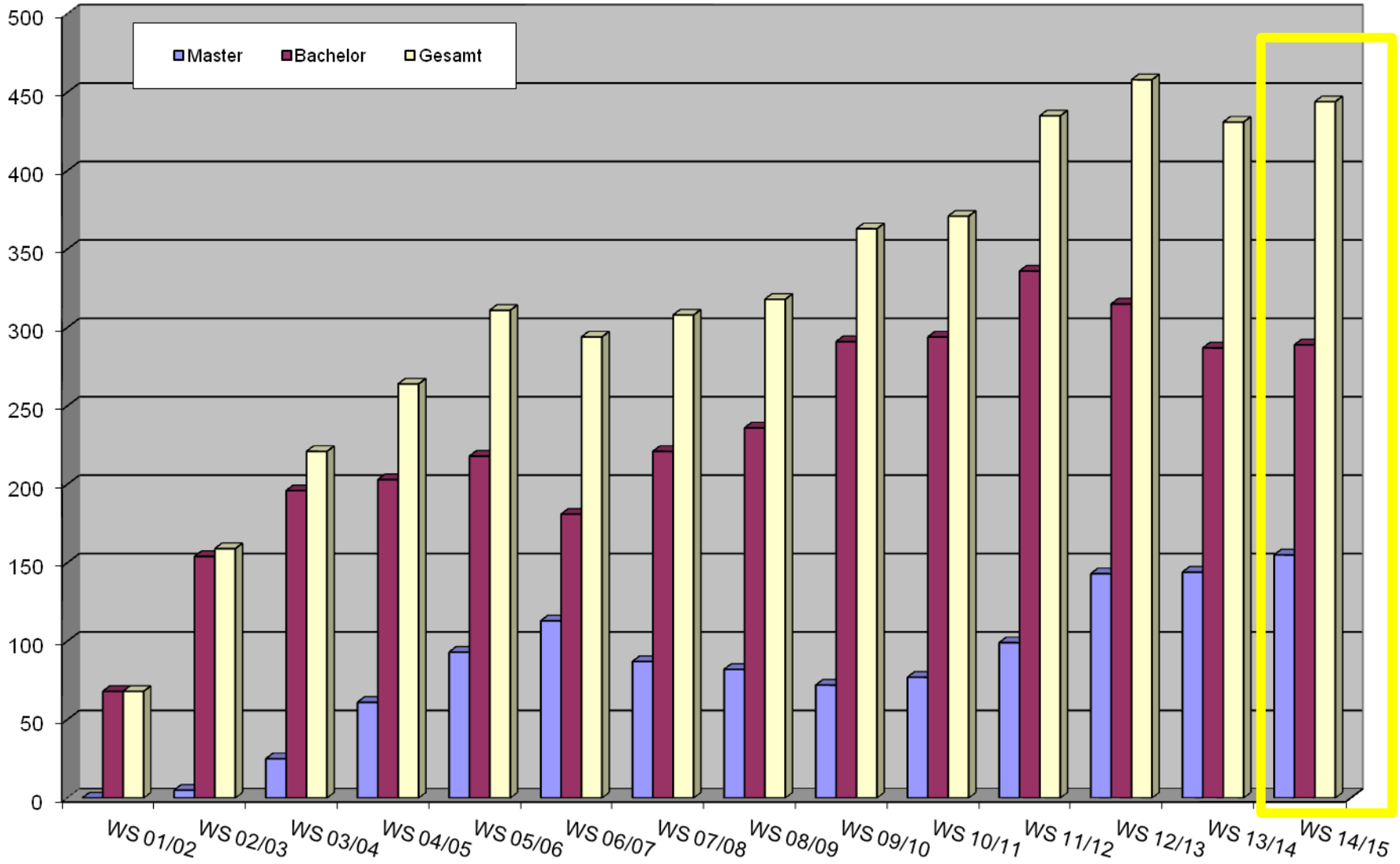
What are the real skills of our graduates?

- Water problems are interdisciplinary – our students are trained interdisciplinary
- System orientation instead of faculty orientation: the look beyond the horizon is part of the training
- Skills in various foci: natural science, engineering, economics, ecology, planning
- Very good language skills
- Frequently, bachelor and master thesises are performed abroad, mostly self-organized: benefits in self confidence, improvisation, stamina and independence
- Most Water Science students have a very high intrinsic motivation“ – they have clear ideas why they chose this subject
- „Water Science Club“: Alumni stand together

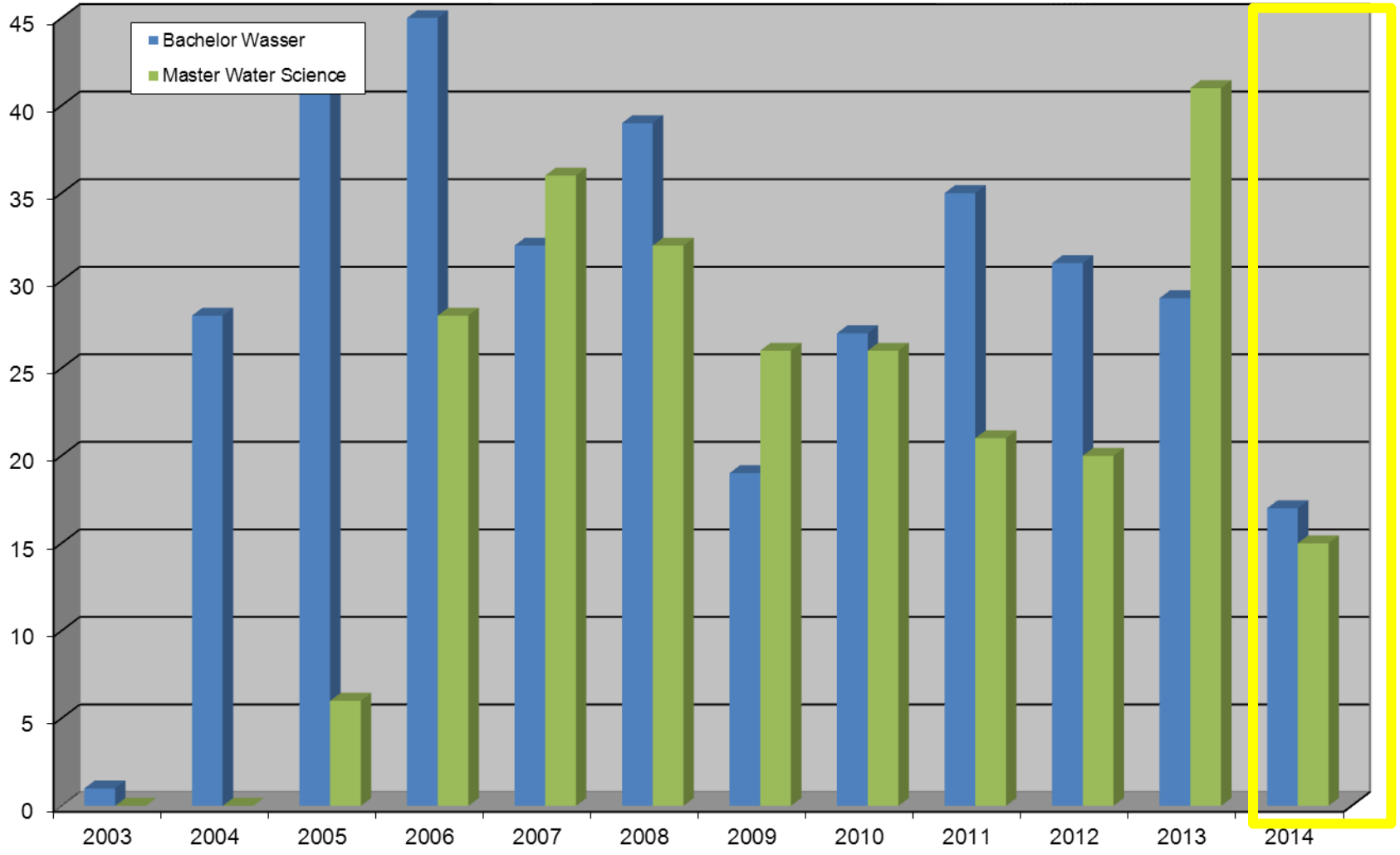
How many have commenced „Water Science“?



How many students are in „Water Science“?



How many have graduated in „Water Science“?



Distribution of marks of master thesises 2014

Graduations total		**34**
Excellent:	**96 – 100 Points**	**7 (20 %)**
Very good:	**91 – 95 Points**	**8 (23 %)**
Good:	**76 – 90 Points**	**17 (50 %)**
Satisfactory	**61 – 75 Points**	**1**
Sufficient	**50 – 65 Points**	**1**
Failed	**< 50 Punkte**	**-**

Countries: Belgium (2); Denmark (2), Finland (1); Netherlands (1); Switzerland (1); Canada (1); USA (2), Germany (24)

Observation: Master thesis is considered the climax of studies and is taken very serious. Marks are better than in exam papers

Marks in general more competitive than in earlier diploma curricula

⇨ Again: many „latecomers“: 10 + 1 Semester

The master thesis is a serious scientific study and frequently basis for scientific publications (meanwhile > 100 papers from thesises)

And now?

You start to look for a job or a Ph.D. thesis:

In what am I really good?

What do I want to do?

Where do I want to work?

Criteria of recruiters

- Experience from practicals
- Temporary stay abroad (optimal: 6 months or more)
- Soft Skills (capacity for teamwork and communication, creativity, self-criticism, stamina, resilience)
- Excellent grades, particularly important: awards
- Good specialization on one or more fields
- Fundamentals in economics, patent and legal aspects in the specialized field
- Englisch: at least business fluent
- Acting responsible
- Mobility (frequently very difficult for „Ruhri´s“)
- Discipline
- Networking
- Good manners

Professional prospects on international market

- Drinking water supply
- Waste water treatment
- Sea water desalination
- Industrial water systems (e.g., power plants, food, pharma, semiconductor, car, paint industries
- Chemical-analytical laboratories
- Microbiological water laboratories
- Regulation administration
- Water expert in developing countries
- Disaster management

The fate of our master graduates (1)

Most of them are or were busy with their Ph. D. thesis

In Germany:

- Biofilm Centre, Universität Duisburg-Essen
- Instrumentelle Analytische Chemie, Universität Duisburg-Essen
- Institut für Energie- und Umweltverfahrenstechnik, Universität Duisburg-Essen
- Organische Chemie, Universität Duisburg-Essen
- Technische Chemie, Universität Duisburg-Essen
- Abfallwirtschaft, Universität Duisburg-Essen
- IWW Zentrum Wasser, Mülheim
- Medical School, Essen
- Institut für Energie- und Umwelttechnik e.V. (IUTA), Duisburg
- Max-Planck-Institut für Kohleforschung, Mülheim/Ruhr
- Institut für Hygiene und Öffentliche Gesundheit, Universität Bonn
- Institut für Mikrobiologie und Biotechnologie, Universität Bonn
- Biochemie, Forschungszentrum Jülich
- Department Of Cell Biology, UK Aachen
- LS für chemische Verfahrenstechnik, RWTH Aachen
- Institut für Mikrobiologie und Biotechnologie, Biozentrum Klein Flottbek, Hamburg
- Institut für angewandte Geowissenschaften, TU Darmstadt
- Bundesinstitut für Risikobewertung, Berlin

The fate of our master graduates (2)

Outside Germany:

- Institut für Pharmazie, Abteilung Pharmakognosie, Universität Innsbruck, A
- Analytical Chemistry (Prof. Hauser), University Basel, CH
- Biogeochemistry and Pollutant Dynamics, ETH Zurich, CH
- Environmental Chemistry, ETH Zurich, CH
- WETSUS, Leeuwarden, NL
- TU Delft, NL
- Aalborg University, DK
- Danish Technology University, Environmental Engineering, DK
- School of Forestry, Northern Arizona University, USA
- Department of Civil and Environmental Engineering (Prof. Luthy), Stanford University, USA
- Center for Water Resources Studies Dalhousie University, Halifax, Canada
- Western Australian Organic and Isotope Geochemistry Centre (Prof. Grice), Curtin University, Australien

And: there is an increasing number of finished Ph.D. thesises!
There is life after the thesis!

The fate of our master graduates (3)

Many Alumni of the master course have found a position in industry or research:

- Centre for Desalination (Ce-Des e.V), Duisburg
- Zentrum für BrennstoffzellenTechnik, Duisburg
- Institut für Energie- und Umwelttechnik e.V. (IUTA), Duisburg
- Krohne Analytics, Duisburg
- IWW Zentrum Wasser, Mülheim
- Applikationschemikerin Gerstel, Mülheim
- BK Giulini, Düsseldorf
- Niederrhein-Gold Teerstegen GmbH, Mikrobiologie, Moers
- Projektmanager (Pipelineplanung), TWP Ingenieurbüro GmbH, Hattingen
- Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, Dortmund
- TÜV Rheinland, Sachverständiger für Betriebswasseranalytik
- Macherey&Nagel, Produktentwicklung, Düren
- Grünenthal Pharma, Aachen
- Letzner Pharmawasseraufbereitung, Hückeswagen
- Field Service Engineer, GE Betze GmbH
- Field Service Engineer, GE Water Microdyn Nadir GmbH, Water Treatment Applications, Wiesbaden
- Eko-Plant Ökotechnische Systeme, Neu-Eichenberg
- Fraunhofer ITEM, Hannover
- Trainee Jacobi Carbons
- Brita Filter, Taunusstein
- Energy Consultant, EPM Assetis GmbH, Frankfurt am Main
- Elementar Analysesysteme, Hanau
- Meri Entsorgungstechnik GmbH, München
- Trainee Wacker Chemie, Burghausen
- Project Manager, Hager + Elsässer, Stuttgart
- Projektingenieur Grundwassersanierung/Verfahrenstechnik Firma Bilfinger Berger Umweltsanierung GmbH, Mannheim
- Paques B. V. Water Technology, NL
- Institut für Molekularbiologie und Biophysik, ETH Zürich
- Head of Mixing Processes, Aerosol-Service AG Möhlin, Zürich, Switzerland
- Harlan Laboratories, CH-Itingen

The future of „Water Science“ graduates (1)

Fachkräftemangel in der Krise?

Medial ist Fachkräftemangel gegenwärtig kein Thema, die Herausforderungen bleiben. Im kommenden Aufschwung werden sich die Rekrutierungsmöglichkeiten der Unternehmen drastisch verschlechtern.

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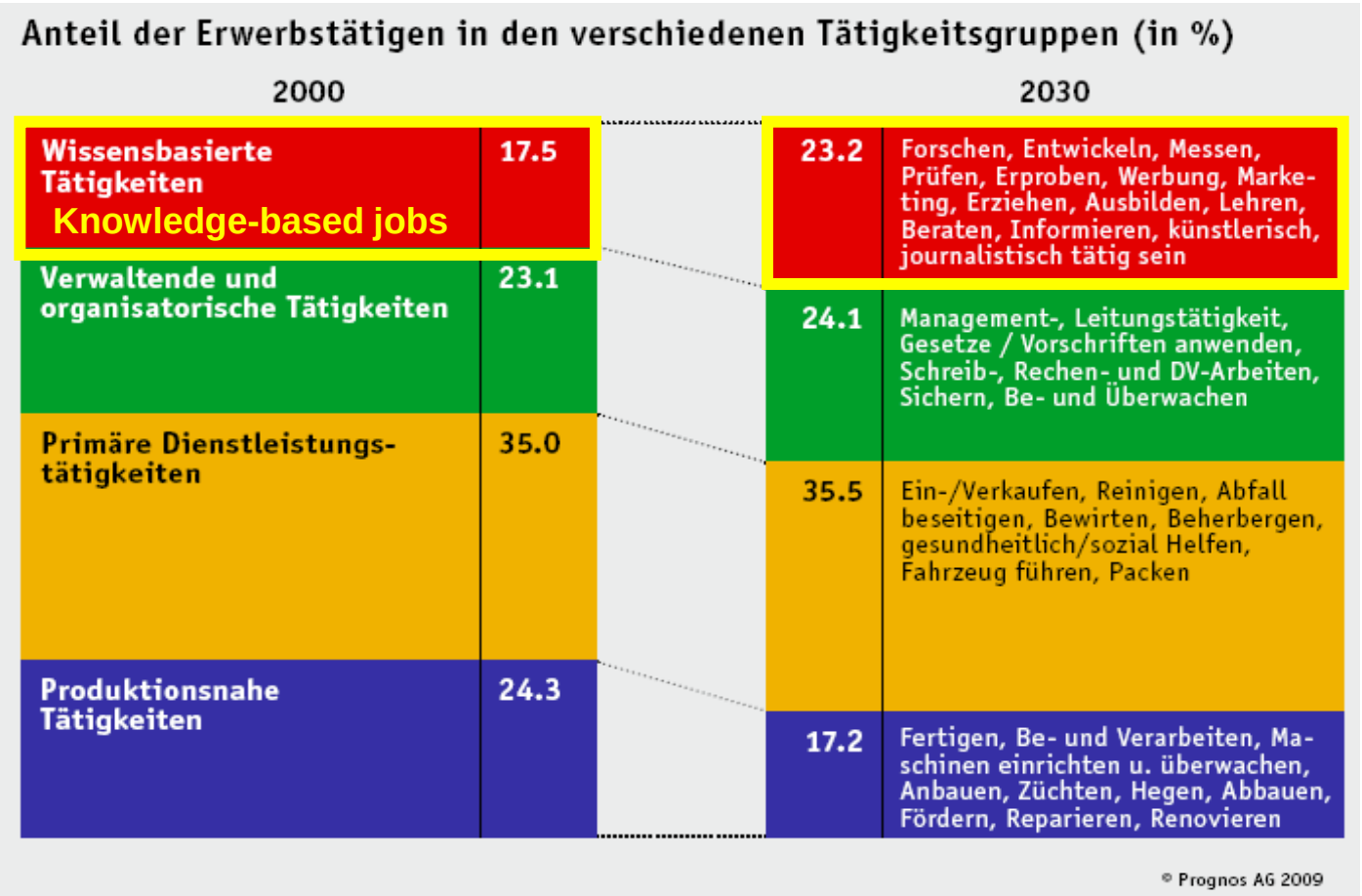
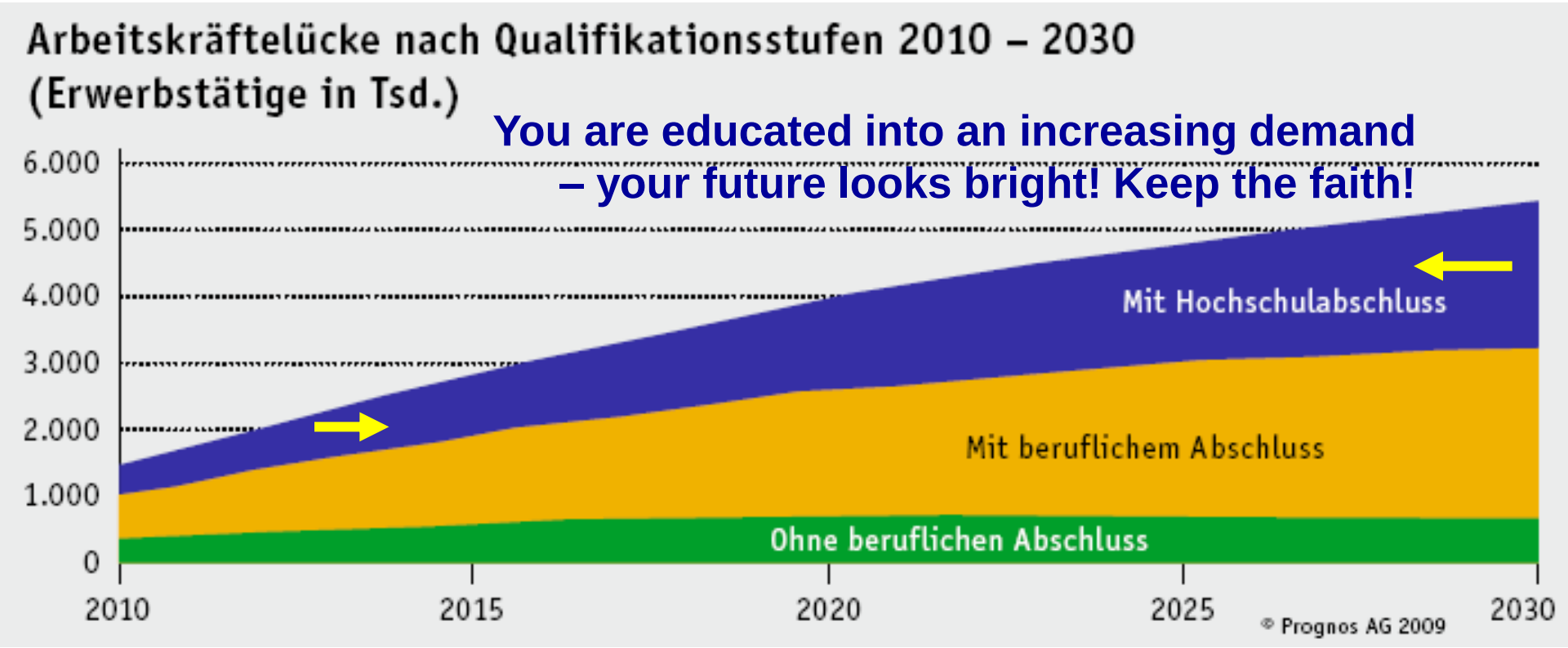


The future of „Water Science“ graduates (2)

Job gaps in various qualification levels 2010-2030



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