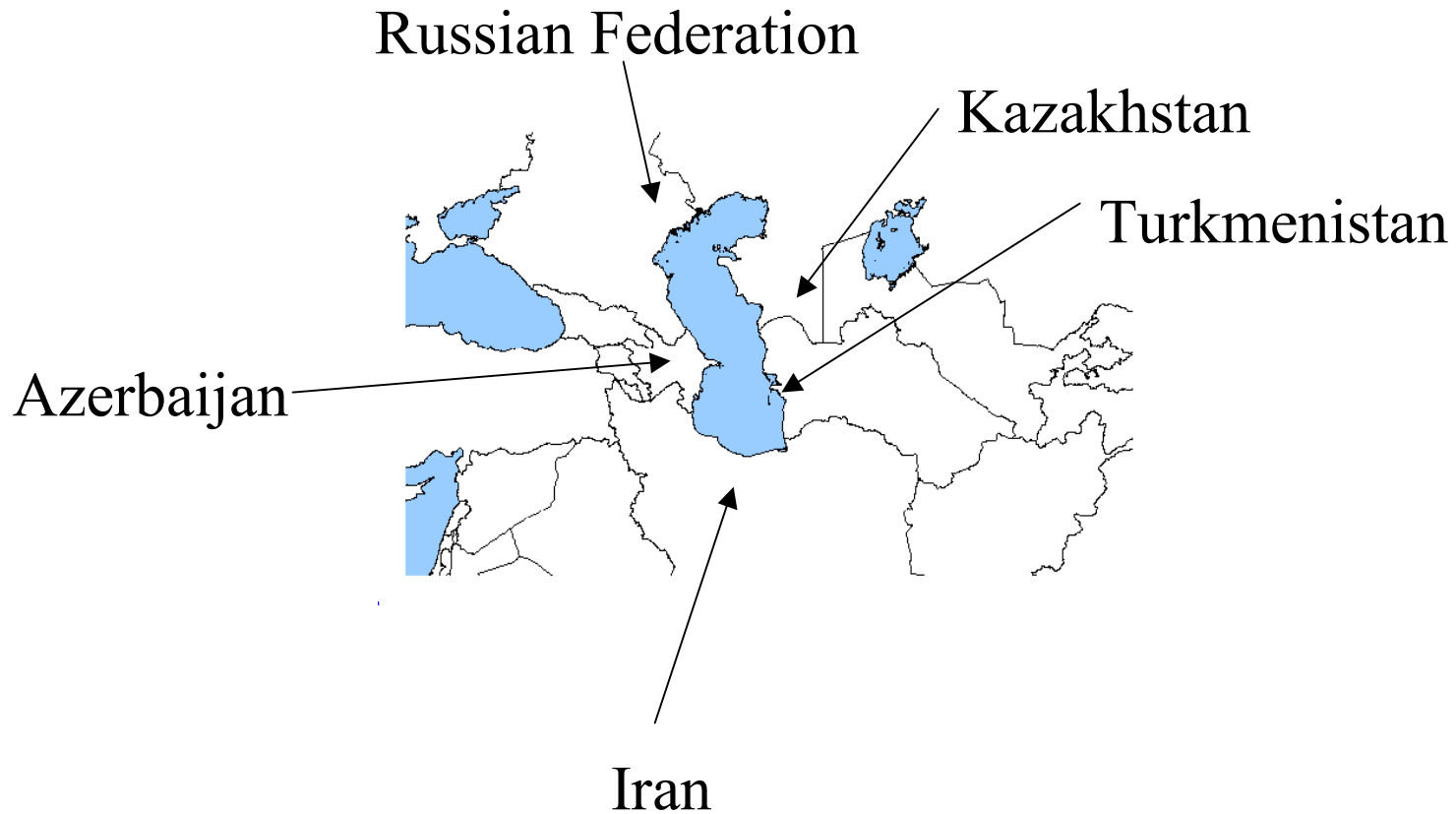


Recreational Water Quality and Human Health in the Caspian Region

**Kathy Pond, Aidan Cronin and Steve Pedley
Robens Centre,
University of Surrey, UK**



Map Showing Study Area



Aim of Project

- To develop and deliver a training course for health-based monitoring of groundwater and recreational water in the Caspian Sea region (April 2001)
- To provide laboratory and field equipment
- To establish pilot monitoring programmes



Issues Related to Water Used for Recreational Purposes

- Tourism - financial benefits
- Health Issues



Part of every
day life



Pathogens Associated With Recreational Use of Water

- *Acanthamoeba* spp
- Adenovirus
- Coxsackie virus
- Cryptosporidium
- Dermatophyte fungi
- Echovirus
- *Giardia lamblia*
- Hepatitis A
- *Leptospira* spp
- Microsporidia
- *Mycobacterium marinum*
- *Naegleria fowleri*
- Poliovirus
- *Pseudomonas aeruginosa*
- *Shigella* spp
- Schistosomes



Other Hazards Associated with Recreational Water Use Areas

- Physical hazards
- Chemical contamination
- Venomous animals



Objectives of Training Course

- To outline the importance of monitoring recreational water and beach quality to protect human health
- To outline the importance of linking monitoring to management and designing remedial measures.
- Emphasis on practical work



Course content

- WHO Guidelines for Safe Recreational Water Environments
- Background to use of indicators
- Rationale for using the chosen indicators
- Techniques for water sampling
- Techniques for analysing water quality
- Quality control
- Interpretation of results and management options
- Sanitary inspections



Design of Pilot Project

- Pilots conducted in Azerbaijan, Iran and Turkmenistan
- Co-ordinators in each country responsible for selecting the beaches to be sampled and the laboratories to undertake the analysis
- Criteria for selecting a beach: it must be regularly used for bathing and close to the laboratory



Quality Control

- All field and laboratory equipment was sent out prior to the training course - media, filtration equipment, glassware, sampling equipment, incubators and autoclaves.
- To ensure comparability standard recording forms and instructions were used.
- Local contracts were issued to the laboratories



Laboratory Equipment



Water Quality Sampling

- Samplers collect 500 ml of water in sterilised containers from the same point, at the same time weekly or monthly.
- Sampling carried out in accordance with standard procedures recommended by the American Public Health Association.
- Samples immediately labelled, packed in cool box and transported to laboratory.



Sampling Team - Iran



Other Information Recorded

- Number of bathers
- Meteorological conditions
- Temperature of water
- pH of water



Sanitary Survey

- Identifies sources of microbiological pollution
- Reviews the adequacy of the sampling programme and any management measures in place to deal with known hazards
- Recommended by WHO to carry out a sanitary survey at the start of the bathing season and before any new activities that could affect the quality of the beach



Sources of Contamination



Recording

- Results of the water quality sampling and sanitary survey are forwarded to the office of the Caspian Environment Programme in Baku and to the WHO Collaborating Centre at the Robens Centre each month.
- A follow-up visit was made to the region three months after the start of the programme

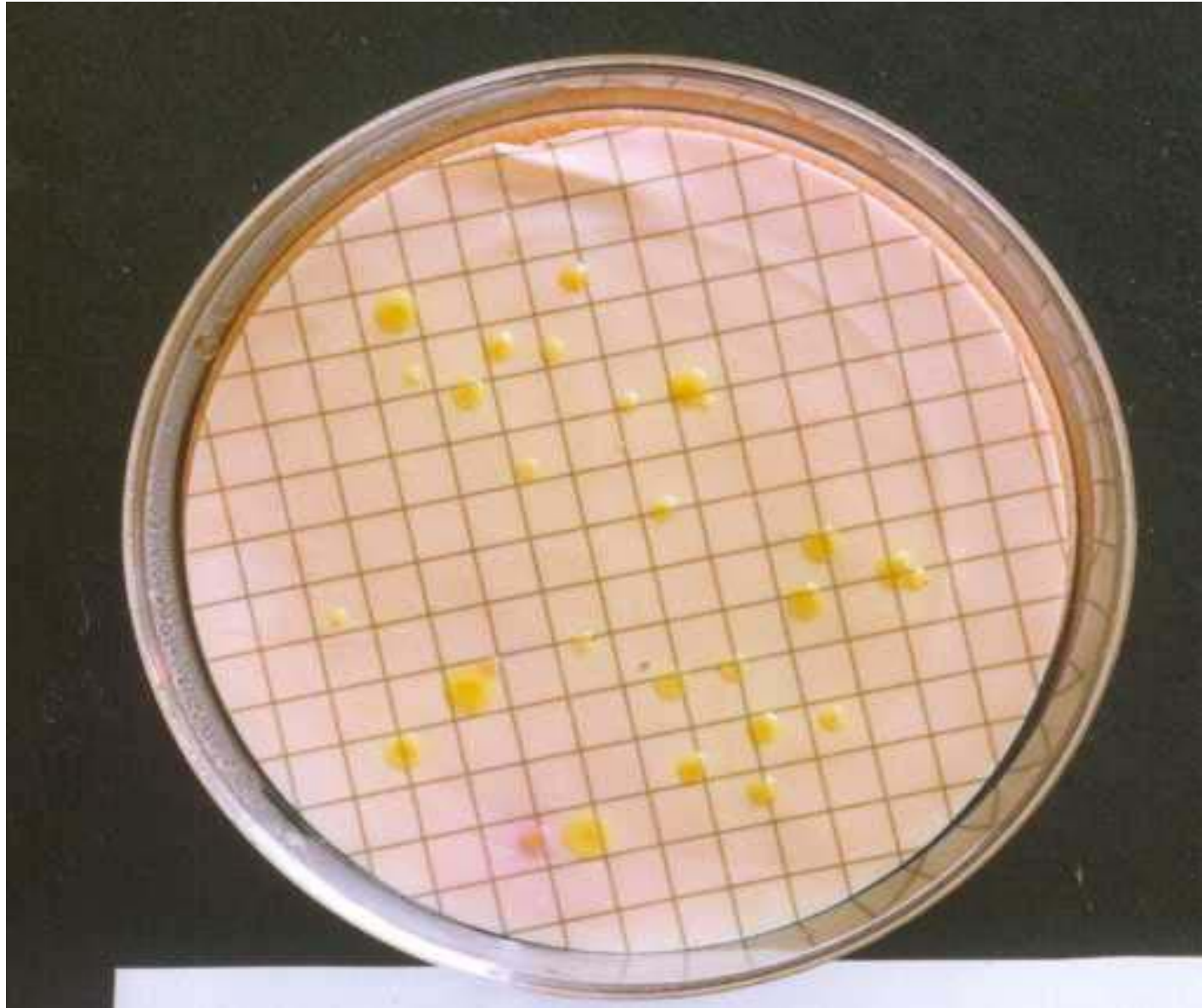


Chosen Indicators of Microbiological Contamination

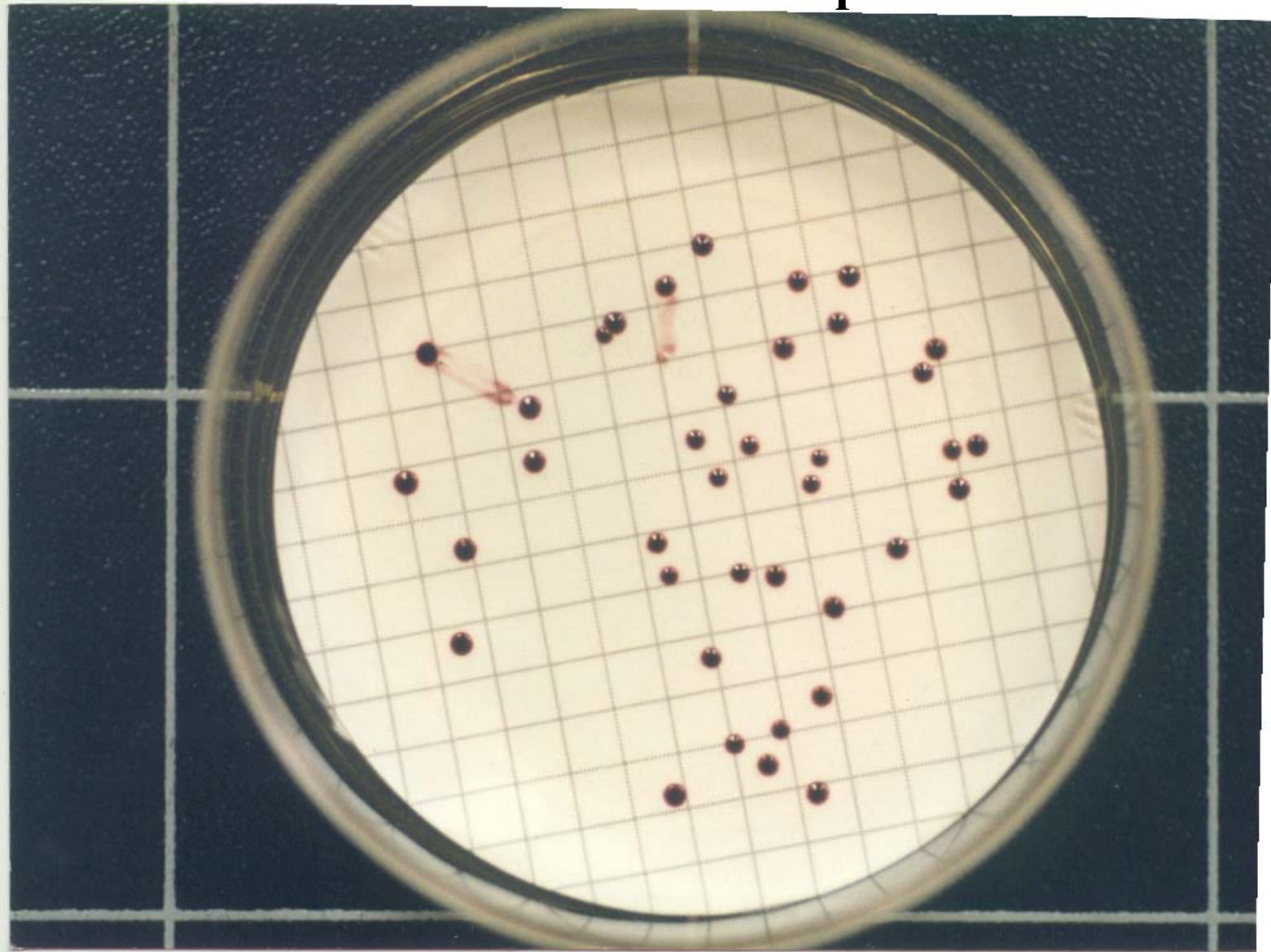
- *E. coli* - always faecal in origin
- Faecal streptococci - widely accepted as good indicator of faecal pollution. Show a close relationship with gastrointestinal symptoms associated with bathing in marine and freshwaters.
- WHO Guidelines based on faecal streptococci



E. coli



Faecal Streptococci



Bathing water standards and Guidelines (EC and WHO)

Parameter	EC Standard	WHO Guideline
<i>E. coli</i>	95% <2000 per 100 ml (Mandatory)	None
Faecal streptococci	100 per 100 ml (Guide)	200 per 100 ml (Guide) relates to an average probability of one case of gastroenteritis in 20 exposures



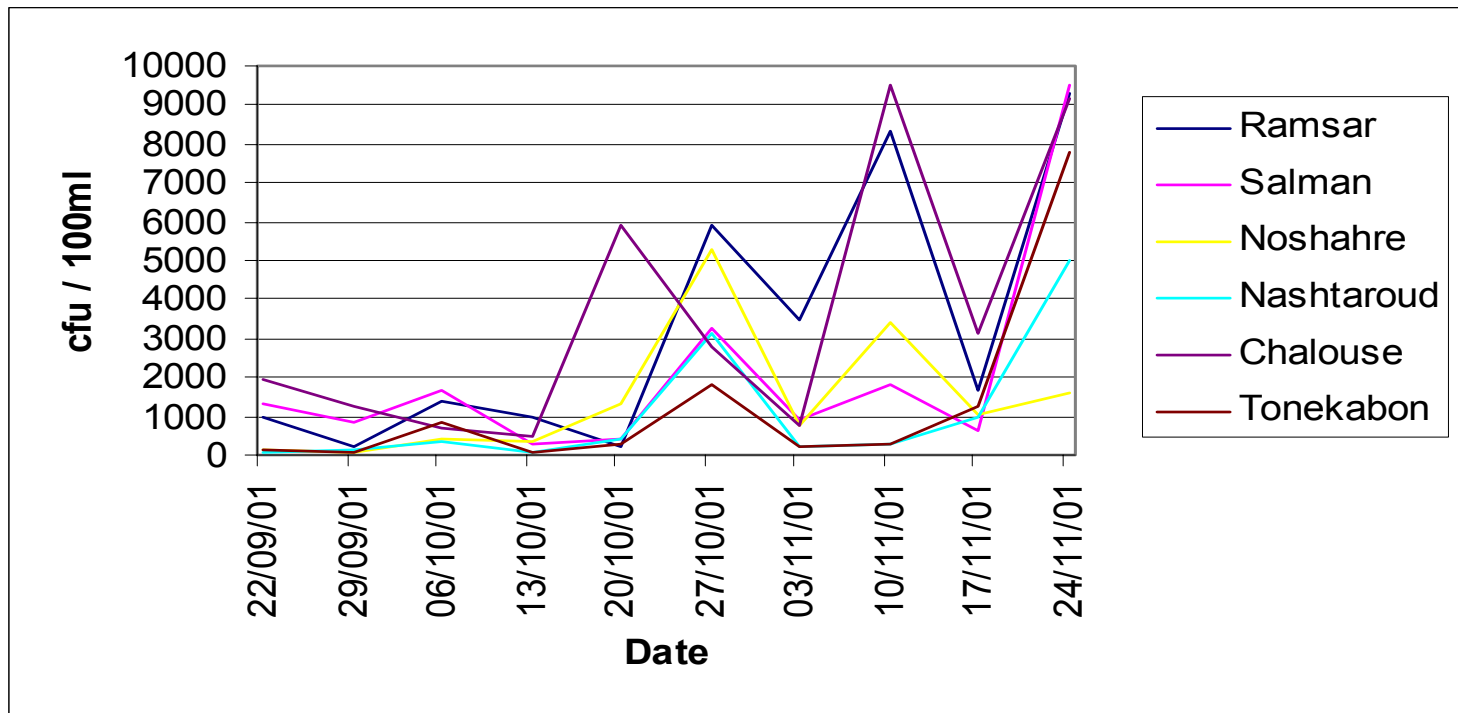
Sampling Areas - Iran



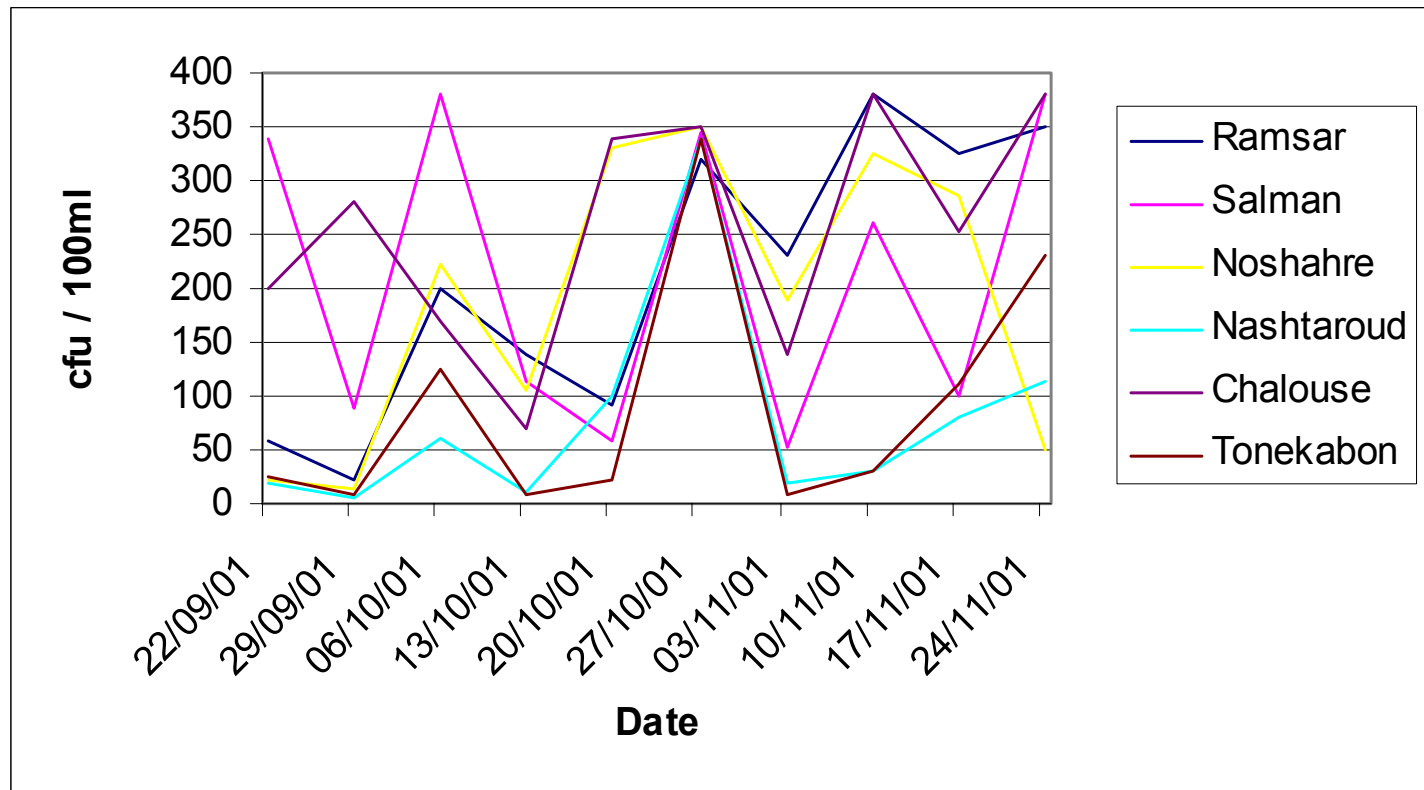
Total 10 sites monitored



E. coli concentrations from six recreational bathing waters, Iran



Faecal streptococci concentrations in six recreational water areas, Iran



Summary of Results - Iran

- 10 beaches sampled
- Four beaches failed EC Guideline for *E. coli*
- Noticeable peaks in concentrations of faecal streptococci



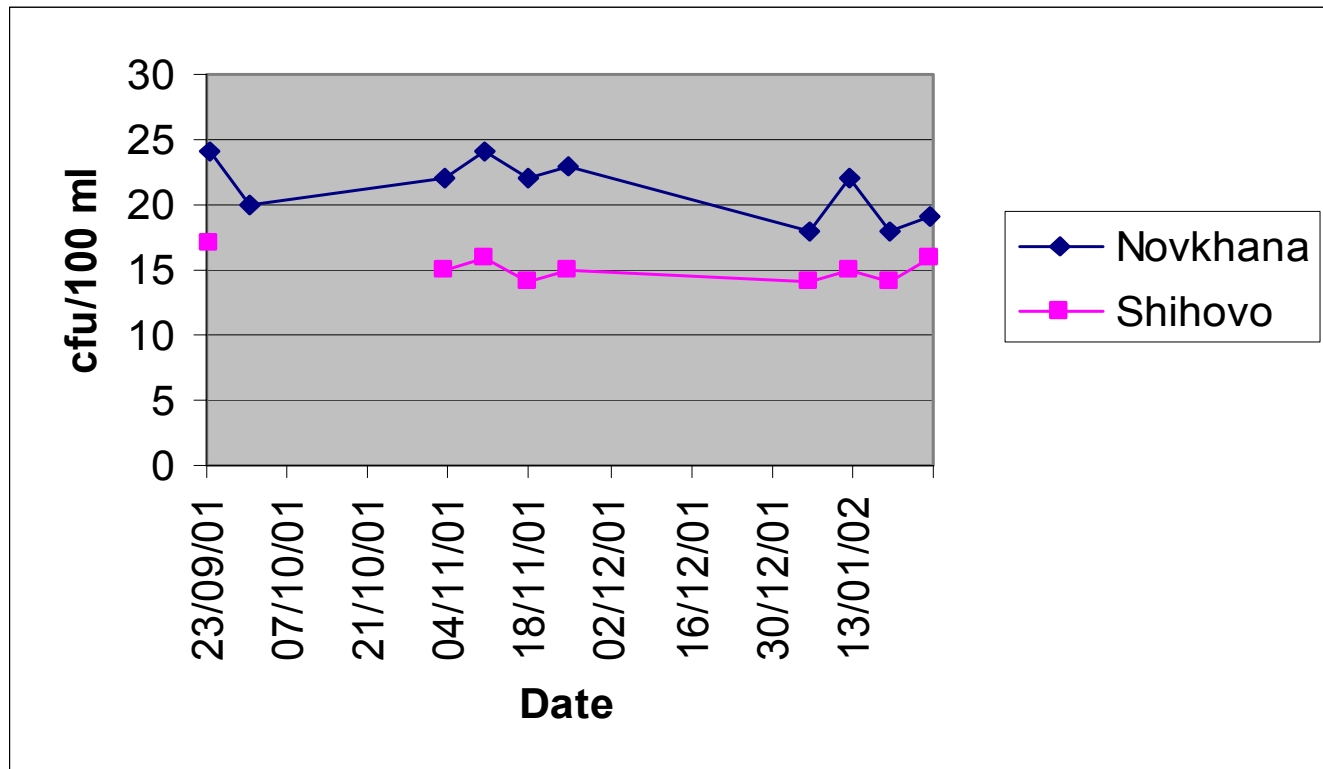
Sampling Areas - Azerbaijan



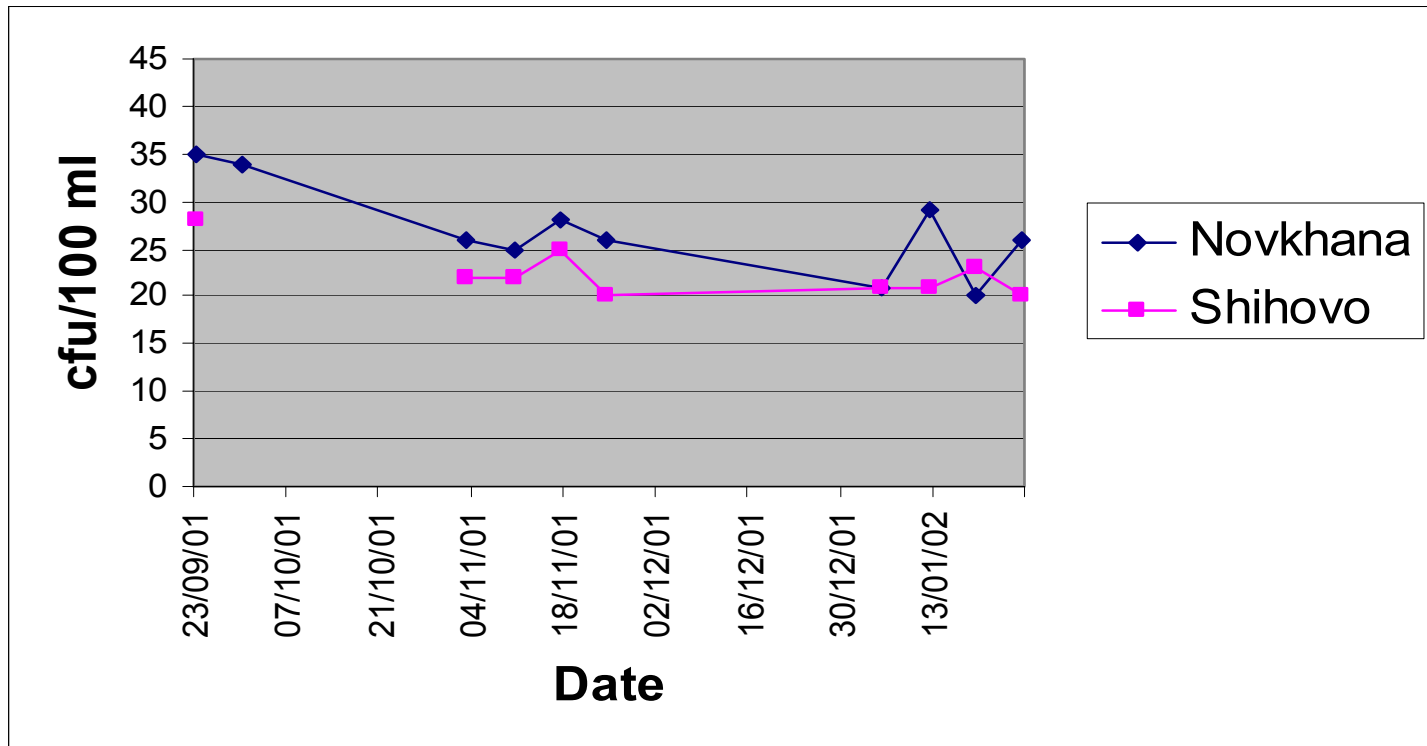
Total 3 sites monitored - approximately 100 Km apart



E. coli counts per 100 ml at two recreational bathing beaches, Azerbaijan



Counts of faecal streptococci per 100 ml at two recreational bathing beaches, Azerbaijan



Summary Results for Azerbaijan

- Three sites sampled.
- *E.coli* counts less than EC Guide value
- Faecal streptococci counts less than EC guideline value



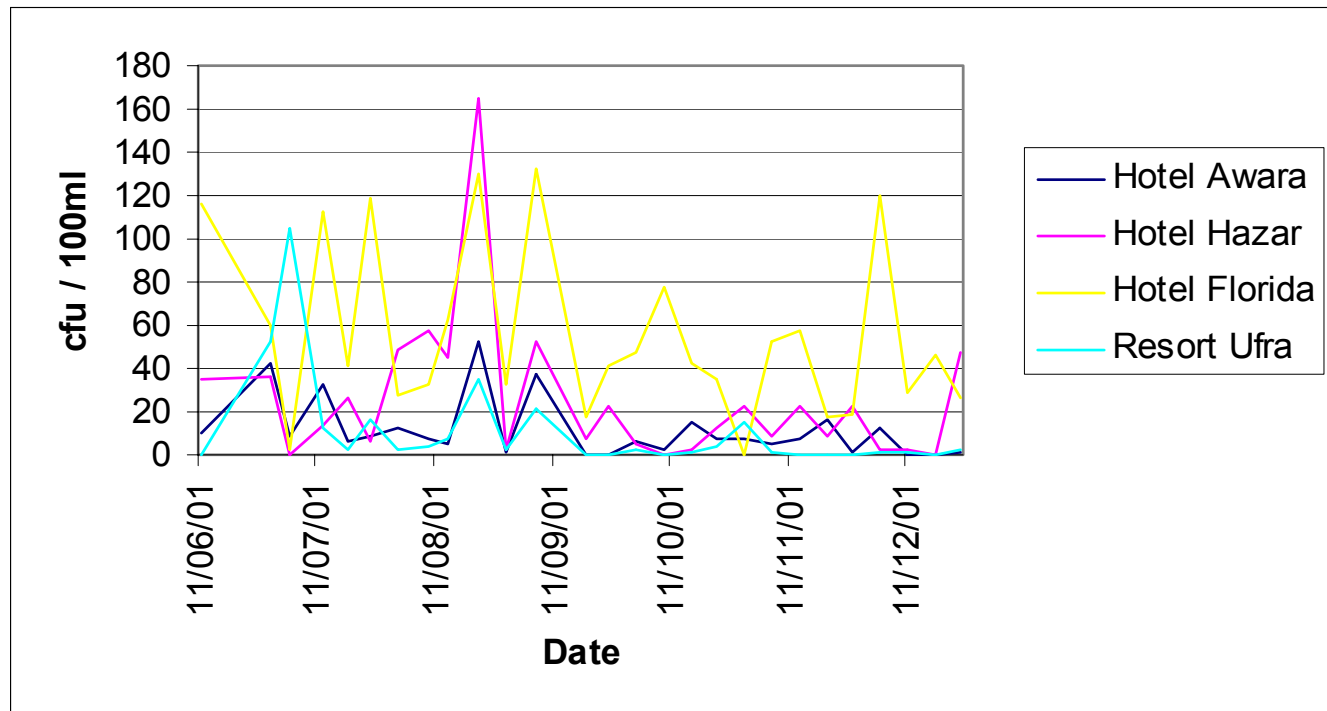
Sampling Areas - Turkmenistan



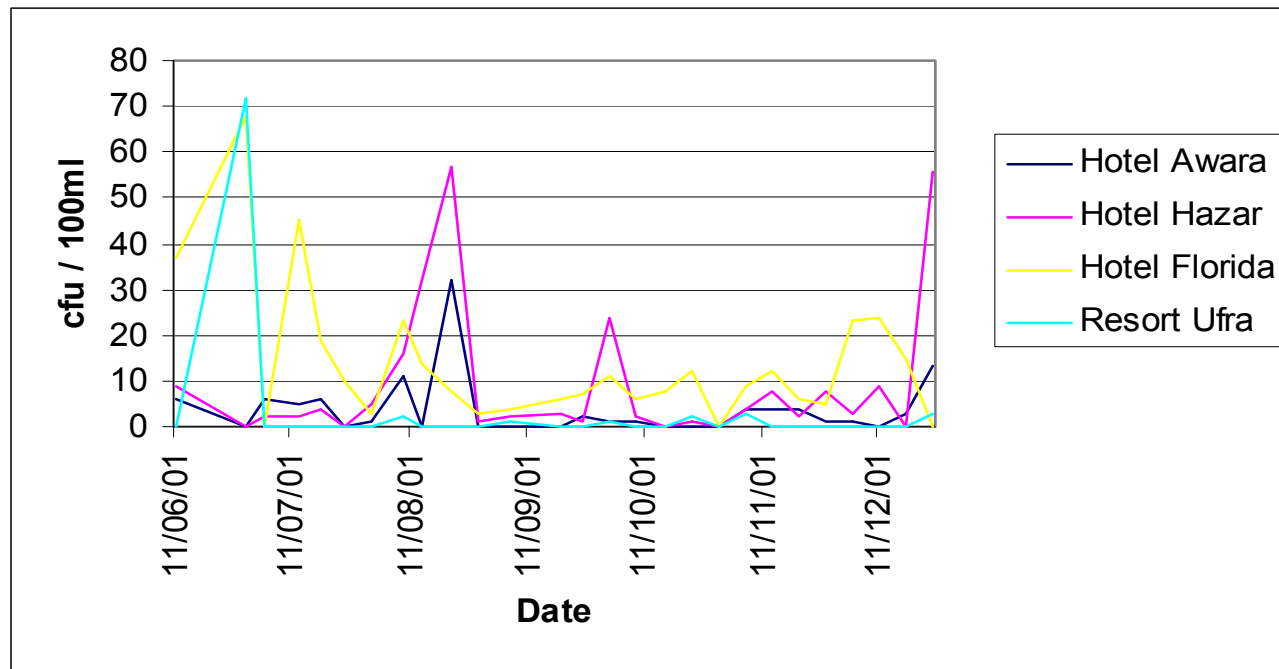
Total 4 sites monitored. Approximately 26 Km apart



Counts of *E. coli* bacteria/100 ml at four recreational bathing areas in Turkmenistan



Counts of faecal streptococci per 100 ml, at four recreational bathing sites, Turkmenistan



Summary of Results from Turkmenistan

- Four sites sampled
- Generally good quality
- Two sites regularly show counts of *E. coli* greater than 100 per 100 ml - exceeding the EC guide value
- All sites are within the Mandatory value
- All sites less than 100 faecal streptococci per 100 ml



Conclusions

- Results so far seem to indicate compliance with EC Standards and WHO Guidelines in Turkmenistan and Azerbaijan
- Considerable spatial and temporal variation in microbiological quality is noted indicating changing health risks



Achievements

- The programme helped to strengthen technical co-operation and capacities between countries
- Provided guidance on the establishment of local capabilities for controlling water-borne diseases
- Raised awareness of WHO guidelines
- Strengthened regional data collection, and provided an infrastructure for a long-term programme of monitoring and data collection
- Promoted discussion and co-operation between bordering countries of the Caspian Sea

