

# Index

Numbers in *italic* indicate figures, numbers in **bold** indicate tables

- Aberdeen, water supply 184  
Aberfan colliery disaster 298, 299  
Abyssinian wells 160, 232, *see also* Norton tube well  
adits 128–135, **130–132**, 134, 150  
    Gibraltar 251–252  
    pre-1600 128–129  
    use of explosives 129
- Africa  
    North  
        British hydrogeological work 219–225  
        World War II, water supply 171–172, 173, 174, 220, 221  
    Southern Rhodesia, resistivity measurement 263–268  
    West  
        aquifers 231–232, 231, **233**  
        borehole siting 6, 233, 235  
        British geological surveys 229–230, **232**  
        British hydrogeological work 229–235  
        water supply 232
- Allenheads lead mine, Northumberland 140–141, 141  
Alre catchment scheme 348–350  
Anderson, James (1739–1808) 24, 25  
Andrews, John Napier (1930–1994) 8  
Ansted, David Thomas (1814–1880) 4, 159, 160  
Aqua Sulis 193  
aquifer  
    confined, London 113–114  
    Denge Beach 356–360  
    dolomitic conglomerate 21  
    models 329–331, 352, 354, 360  
    perched 145, 172  
    sandstone, hydraulic properties 116  
    South Downs aquifer management 339–344  
    unconfined  
        Bushey Meads 3  
        Colne Valley 114  
        transient flow 320–321  
        West Africa 231–232, **233**
- Aquifer Storage and Retrieval 368  
Arabian Peninsula, British hydrogeological studies 222–224  
Archimedes screw 135, 139  
Ashford tube filter 165, 168
- Bahrain, British hydrogeological work 222  
Bailey, E.B. 255, 271  
bailing 127–128  
Bakewell, Robert (1767–1843) 2  
barytes precipitation 149–150  
Basin studies 378  
Bath  
    thermal springs 4, 193–198  
        17th century 194–195  
        18th and 19th century 27, 195–196  
    Celtic legend 193  
    chemistry 194–196  
    Middle Ages 194  
    modern era 197–198  
    radioactivity 197  
    Roman baths 193  
    temperature 196–197
- Bath stone, use in caisson 17–18  
Batheaston Mining Company 26–27  
beam engines 137  
Beeby-Thompson, Arthur (1873–1968) 6, 169, 230, 254  
Belfast, water supply 184, 185–186, 188  
Bevan, Benjamin (1773–1833) 18–19  
boreholes 3  
    artificial recharge 351–352  
    data 1  
    Gibraltar 250, 251, *see also* Gibraltar, water supply  
    military 160, 165, 168  
    observation 329, 349, 352  
    seasonal use 276  
    Southern Rhodesia, resistivity measurement 263–268  
    United Kingdom, data collection 273–274  
    West Africa 233, 235  
    work of William Whitaker 56–58
- Bostock, R. 93, 96, 97  
Boult, J. 93–94, 98, 99, 101  
Boulton, Norman Savage (1899–1984) 6, 7, 319–322, 319, 364  
Bridgewater Canal 135  
Brighton abstraction policy 340–342  
British Expeditionary Force, World War I 162–167  
British Geological Survey 363  
Broad Street pump, London 37–47, 41, 42, 44, 46, 47  
Brunel, Isambard Kingdom (1806–1859) 151  
Brunel, Marc (1769–1849) 151  
Buchan, Stevenson (1907–1996) 7, 272, 273, 276, 287–292, 288, 364  
    Geological survey, field mapping 287–289  
    Water Department 289–291
- Buckland, William (1784–1856) 2  
Buddle, John 143  
Burnside Boring Machine 148  
Bushey Meads, Hertfordshire 3
- caisson 17–18, 17, 19  
canals, engineering work of William Smith 17–21  
Candover stream pilot scheme 344, 347  
Caribbean, work of IGS 312  
Carsington Reservoir Scheme 335  
Celts, respect for groundwater 183–184  
cemeteries, pollution 1, 101  
Central Water Data Unit 366  
Central Water Planning Unit 296, 334–336  
cesspits 4, 37, 45, 46, 57  
Chad Basin 230, 231  
    Development Commission 234  
Chaddock Level, Bridgewater Canal 135

- Chalk 1, 3, 4, 5, 276–277  
 artesian system 73  
 chemical analysis 276, 306  
 chloride contamination 352–355  
 confined aquifer, London 113–114  
 contamination, Kent coalfield 276, 328  
 East Yorkshire 306  
 exploitation of groundwater 324–326, 327  
 first hydrogeological map 70, 71  
 groundwater fluctuation 279  
 non-equilibrium flow 284, 290  
 resistivity measurement 275  
 saline intrusion 276, 328  
 Thames Basin 57  
 unconfined aquifer  
 Bushey Meads 3  
 Colne Valley 114  
 work of Joseph Lucas 70, 71, 72–75  
 work of William Whitaker 54, 56, 57, 59
- chalybeate springs, Tunbridge Wells 201–211
- Charleton, R. 195
- chemistry  
 analytical 4, 196  
 Bath thermal water 195–196  
 groundwater 99, 101, 175–176
- Cheshire Basin  
 Permo-Triassic sandstones 89–102, 90  
 groundwater flow 99  
 groundwater model of Robert Stephenson 1850  
 91–92
- chloride contamination, Tilmanstone mine 352–355
- cholera 4, 34–37  
 Gibraltar 248  
 London, work of John Snow 34–47
- Clutterbuck, Reverend James Charles (1801–1885) 3, 56  
 objection to work of Robert Stephenson 115
- coal mills 136–137
- Cold War 1949–1989, military geology 175–178
- Colne Valley experimental well 114
- Combe Hay caisson tunnel 19
- The Compleat Collier* 138, 142, 151, 153
- conductivity, hydraulic 115
- cone of depression 3, 99, 347, 348, 350
- cone of exhaustion 99
- cone of influence 115, 116
- contamination  
 agricultural 374, *see also* nitrates  
 cemeteries 1, 101  
 chloride in minewater 352–354  
 industrial 101, 374–375  
 metals in mine water 148–149  
 nitrates 309–310, 311, 328, 335, 373–374  
 nuclear 375–376  
 saline intrusion 100, 276  
 sewage 4, 6, 37–47, 101, 213, 247–248, 374  
 waste disposal 308, 309, 328, 370–377
- Control of Pollution Act 1974 296, 328
- Conybeare, William Daniel (1787–1857) 2
- copper, precipitation from mine water 149
- Cork, water supply 188
- Cornwall  
 copper and tin mines 127, 133, 147  
 mine water quality 149
- Coulson, William “Sinker” 145–146, 152–153
- Cunningham, J. 93
- Cyprus, work of IGS 312
- Dallam Lane Forge Well, Warrington 100
- Dalton, John (1766–1844) 1, 92, 93  
 water balance apparatus 93
- Darcy flow experiments 97, 99
- Darcy’s Law 112
- Darwin, Erasmus (1731–1802) 1
- data collection 328–329
- Dawkins, W.B. 94, 98, 99
- De la Beche, Thomas (1796–1855) 4, 159
- De Rance, Charles Eugene (1847–1906) 5, 57, 67, 90, 94,  
 96, 97, 98
- Delesse, Achille Ernest Oscar Joseph (1817–1881) 74
- Denge hydrogeological study 356–360
- desalination, Gibraltar 258
- dewatering 127–139, 142
- Dixey, Frank (1892–1982) 6
- dowsers 170, 171, 253, 256
- drainage  
 Gibraltar 249–250  
 work of William Smith 22–23
- drilling 170–174  
 Itchen River Augmentation 347  
 percussion rig 165, 167, 235  
 rotary, West Africa 232, 235  
 Royal Engineers 174, 177–178
- Dupuit flow equation 97, 115, 364
- Durham Coalfield  
 engineering problems 143–146  
 water quality 149
- earthquake, effect on groundwater 5, 277, 284
- East Anglia  
 Crag deposits 277  
 groundwater supply 272, 277, 278  
 wartime water supply 171
- East Pool Tin Mine, Cornwall 127
- Edinburgh, water supply 184, 185, **185**
- Edmunds, Francis Hereward (1893–1960) 6
- Egypt, World War II, water supply 172, 173
- Egypt and the Levant, World War I, water supply 169,  
 170
- Egyptian Survey Department 219
- Elkington, Joseph (1739–1806) 23–24
- embanking, work of William Smith 24, 26
- energy, geothermal 376–377
- engineering  
 adits 128–135  
 civil, transfer of technology from mining 150–151  
 mining  
 bailing 127–128  
 early concepts of groundwater occurrence 151–153  
 physical barriers 142–148  
 pre-1600 128–129  
*see also* School of Military Engineering
- England, southern, wartime water supply 171
- Environment Agency 8, 365
- Europe, groundwater pollution 290
- evaporation 1, 364  
 work of H.L. Penman 274
- evaporites, Triassic 100
- explosives, use in mine drainage 129

- Far East, military water supply 176  
 Farey, John (1766–1826) 2, 15, 18, 19  
 flow  
   Darcy flow experiments 97, 99  
   Dupuit flow equation 97, 115, 364  
   groundwater  
     conceptual models 98–99, 112  
     non-steady state, Theis method 275, 284, 290, 320, 321  
     transient 320–321  
   in unsaturated rock, work of T.Mellard Reade 97–98  
 Fox, D. 98  
 Fox, F. 98, 99  
 Fuka Basin, Egypt, World War II, water supply 172, 173
- Gallipoli, World War I, water supply 167–169  
 Gambia, borehole rehabilitation 235  
 Geikie, Sir Archibald (1835–1924) 53, 55, 57  
 Geikie, James (1839–1915) 53, 250  
 geochemistry 101  
 Geological Society of London 2, 3, 51, 58  
   Hydrogeology Group 8  
 Geological Survey *see* Great Britain, Geological Survey  
 Geologists' Association 59  
 geology  
   importance to military 160  
 geophysics 230–231, 263–268, 275  
 geothermometry, silica 196  
 Ghana, water supply 230–232, **233**, 235  
 Gibbes, George 195–196  
 Gibraltar 240, 241  
   caverns 254, 256, 256  
   drainage 249–250  
   geology 239–244, 243, 245  
   groundwater recharge 244  
   hydrogeological survey 1876 250–251  
   Levanter cloud 256  
   reservoirs 252–253, 253  
   water supply 244, 245–247  
     1950–1975 256–257  
     contamination 247–248, 257–258  
     desalination 258  
     dual system 248, 258  
     rainwater and reservoirs 252–253, 253, 254  
     wells and boreholes 248, 249, 250, 251, 252, 253, 255, 257  
     work of Edward Roberts 248–250  
     work of Hector Tulloch 251–252  
     work of Institute of Geological Sciences 1974–1985 257–258  
     work of the Sanitary Commissioners 247–250  
     World War II 255  
 Glanvill, Joseph 194–195  
 Glasgow, water supply 184  
 Gold Coast *see* Ghana  
 Gray, David 275, 276, 278, 290, 295  
 Great Britain  
   Geological Survey 4–7, 271–280  
     data collection 273  
     Edinburgh 186, 190  
     field mapping, work of Stevenson Buchan 287–289  
     geophysical techniques 275  
     Gibraltar 250–251  
     Hydrogeological Department 278–279  
   Ireland 188, 189, 190  
   Joseph Lucas 69–72  
   Wartime Pamphlets 171, 187, 272, 280, 289  
   water analysis 275–276  
   “Water Babies” 274, 290, 297  
   Water Department 273, 274–80  
     work of Jack Ineson 283–284  
     work of Stevenson Buchan 289–291  
     *see also* Water Unit; Hydrogeological Department  
   Water Supply Memoirs 4, 6, 272  
   Water Unit 6, 271, 273, *see also* Water Department;  
     Hydrogeological Department  
   Well Catalogue Series 187, 280, 290, 297  
   work of William Whitaker 52–56  
   work of Stevenson Buchan 287–292  
   *see also* British Geological Survey; Institute of Geological Sciences  
 Great County Adit, Cornwall 135, 149  
 Great Ouse Basin  
   groundwater model 331  
   hydrogeological survey 278, 324  
 Greensand  
   as a source of water 3  
   Lower 75  
     confined aquifer 335  
     river augmentation, Isle of Wight 355–356  
 Greig, A.L. 255  
 ground freezing 146–147  
 groundwater 2  
   Celtic respect for 183–184  
   chemistry 99–100, 216, 275–276, 370  
   contours, first map 70, 71  
   data collection 273, 328–329  
   early conceptualization 91–92, 114, 151–153  
   effect of earthquake 1884 5  
   flow 3  
     conceptual models 98–99, 112  
     non-steady state, Theis method 275, 284, 290, 320, 321  
     transient 320–321  
   fresh 99–100  
   geochemistry 101  
   Gibraltar 244  
   hardness 6, 99  
   hydraulics, work of Norman Savage Boulton 319–322  
   Ireland 183–190  
   level  
     falling 6  
     fluctuation 1, 3, 275, 277  
     effect of Chilean earthquake 277, 284  
     rising 368–369  
   licensing 7, 278  
   Liverpool area  
     hydraulic properties 96–99, 116  
     model of Robert Stephenson 91–92, 116–117  
     quality 99–101, 117–118  
     sources 93–96  
   London, hydraulic properties 114  
   military resource 159, *see also* water supply, military  
   models 7, 329–331, 335, 354  
   ownership 6  
   pollution *see* contamination  
   protection 376  
   quality 4, 99–101

- groundwater *cont.*  
 radio isotope studies 335  
 river regulation 324, 327, 328, 355, 368  
 saline 100, 117, 250, 276, 358–359, 370–371  
 Scotland 183–190  
 United Kingdom, resources 171, 271–280  
 West Africa 231–232
- Guidott, T. (1638–1733) 195
- gunpowder, use in mine drainage 129
- Halley, Edmond (1656–1742) 1
- Hardham Basin, artificial recharge investigation 350–352
- Hartley, John Jerome 188, 189
- head 97, 98
- Henderson Box 232
- Henwood, William Jory (1805–1875) 3
- Hibernia Colliery, Gelsenkirchen 145
- Holkham Hall, Norfolk 23, 57
- Horne, John 186
- Hot Dry Rock programme 306–307
- Houlston, T. 99
- Hull, Edward (1829–1917) 4, 5, 90, 98, 99
- hydro (Scottish hydropathic establishments) 213–217
- hydrogen sulphide 150
- Hydrogeological Department *see* Great Britain,  
 Geological Survey, Hydrogeological Department;  
 Institute of Geological Sciences, Hydrogeological  
 Department
- Hydrogeological Map Programme 297, 298
- hydrogeology  
 first maps 5, 56, 71, 73–74  
 first use in modern context 5, 68, 70  
 impact of information technology 378  
 Middle East 219–225  
 North Africa 219–225  
 surveys 5, 7  
 training and professional development 379–380  
 UK, development since 1974 363–380  
 West Africa 229–235  
 work of Joseph Lucas 72–79  
 work of William Whitaker 56–58
- hydrological cycle 1, 194
- hydropathic establishments, Scotland 213–217
- IGS *see* Institute of Geological Sciences
- Ineson, Jack (1917–1970) 7, 274–275, 277, 278, 280,  
 283–285, 283, 290, 364  
 early life 283  
 Geological Survey, Water Department 283–284  
 Institute of Geological Sciences 295  
 PhD thesis 284
- information technology, impact on hydrogeology 377–378
- Inland Water Survey 6, 271
- Institute of Geological Sciences (IGS) 291, 295–315  
 Aberfan Tribunal 298, 299  
 Hydrogeological Department 295  
 applied research studies 300, 302, 307  
 commercially commissioned research 302, 308  
 data collection 297  
 database studies 298, 305  
 funding 296  
 geothermal studies 306–307, 313  
 government funded overseas activities 302–304,  
 312–313
- Hydrogeological Map Programme 297, 298
- London flood protection system 302, 303
- Physical Properties Laboratories 298, 300
- pollution control studies 308–312
- regional and resource studies 298, 301, 306
- research 1971–77 304–313
- strategic role 296–297
- International Association of Hydrogeologists 290
- ion exchange 100
- Iran, work of IGS 303, 305
- Ireland, water supply 183–190
- iron oxide precipitation 149
- irrigation, work of William Smith 23–24
- Isle of Wight, Lower Greensand, river augmentation  
 355–356
- Itchen River Augmentation 344–350, 345, 346
- James Pit, Wylam 122
- Jordan, British hydrogeological studies 221–222
- Jorden, Edward 194
- Kennet and Avon Canal, landslips 20
- Kent coalfield 352–355
- Kent Water Preservation Association 6
- Kilsby Tunnel 109–112
- King, W.B.R. (1889–1963) 6, 162–163, 162, 175–176
- Lambeth Water Company 37
- Lambourn Pilot Area, groundwater model 331
- Landfill Research Programme 309, 310
- Lapworth, Herbert (1875–1933) 6, 364
- Lea Valley 57
- Lee Valley 325, 327, 335
- Libya, British hydrogeological work 172, 177, 224, 225,  
 302, 308
- licences of right 329
- limestone, Permian Magnesian 4, 143–146, 150, 277
- Lincolnshire Limestone aquifer 301, 326
- Liverpool  
 water supply 89, 90, 91, 117  
 groundwater model of Robert Stephenson 1850  
 91–92, 116–118  
 quality 99–101  
 sewage contamination 101  
 source of groundwater 93–96
- Liverpool Geological Society 89, 90, 98, 99
- logs, downhole 7, 275, 343
- London  
 cholera 4, 36–47  
 flood protection system 302, 303  
 water supply 3, 57, 70  
 work of Robert Stephenson 112–116
- London Basin  
 groundwater model 330–331  
 work of William Whitaker 53, 55, 57
- London Clay 2, 113–114
- London to Birmingham Railway, work of Robert  
 Stephenson 108–112
- London Westminster and Metropolitan Water Company,  
 reports of Robert Stephenson 113–115
- Lucas, Joseph (1846–1926) 5, 56, 57, 67–86  
 career in Geological Survey 69–72  
 early life 68–69  
 horizontal wells 70, 72

- Lucas, Joseph (1846–1926) (*cont.*)  
 hydrogeological work 72–79  
*The Chalk Water System* 72–73  
 water engineering consultancy 79–81  
 work on Nidderdale 77–78
- MacGregor, A.G. (Archie) 186, 187
- Manchester, water supply 94
- Manchester Geological and Mining Society 89
- mapping  
 geological, Ordnance Geological Survey 159  
 hydrogeological 297, 298  
 military, water supply 165, 166  
 stratigraphic 17
- Mariotte, Edmé 93
- Mediterranean Expeditionary Force, World War I, water supply 169
- Megger Earth Tester 230, 263, 265
- Mersey Estuary, infiltration experiments 94–96, 95
- Mersey Railway Tunnel 98, 99
- Metropolis Water Supply Act 1852 37
- Middle East, British hydrogeological work 171, 177, 219–225
- Midland Valley, Scotland, groundwater 186
- military  
 engineering training 161, 177  
 importance of geology 160  
 geological training 159, 160  
 “pool of geologists” 176–177  
*see also* World War I, World War II
- mines  
 active workings, minimizing water ingress 147–148  
 dewatering 127–139  
 district pumps 139–142  
 drainage adits 128–135, **130–132**  
 nuisance water 122  
 physical barriers against water ingress 142–148  
 Roman 128–129, 130  
 shaft sinking 142–147  
 water inrush 122–127, **123–126**  
 water make 121  
 water pumping 3, 127, 128, 135–142  
*see also* pumps, mine  
 water quality 148–150  
 mineral precipitation 149–150  
 winding water 127–128
- Mitchell, Samuel George (1823–1907) 18
- Mono pump 135
- Morton, George H. 90, 92, 93
- Murchison, Roderick Impey (1792–1871) 4, 53
- Nata Reserve, Southern Rhodesia, resistivity measurement 263–268
- National Plan 327, 331–332, 366
- National Rivers Authority 8, 365–368
- National Water Supply Congress 1878 74, 250
- Natural Environment Research Council 296, 368
- Newcomen, Thomas, steam engine 138–139
- Newtownards 189–190
- Nidderdale, work of Joseph Lucas 77–78
- Nigeria, water supply 231, 232, **233**, 234, **235**  
 nitrates 309–310, *311*, 328, 335, 374
- Norfolk  
 sand embankments 24–25  
 seasonal variation in groundwater level 274, 290  
 wartime water supply 171
- noria* 139, 246
- Normandy, World War II, water supply 172, 174–175, 174, **176**
- North, Lord Dudley (1581–1666) 201–203
- Northern Ireland 8  
 water supply 189, 377  
*see also* Belfast, water supply
- Norton tube well 160, *161*, *162*, 163, 169, 170, 254
- nuclear waste 375–376
- oases 219
- ochre precipitation 149
- Ordnance Geological Survey, geological mapping 159
- Parys Mountain copper mine, Anglesey, water contamination 148, 149
- Peach, Ben 186
- Penman, H.L. 274, 364
- permeability 3–4  
 Permo-Triassic sandstone 97
- Perrault, Pierre (1611–1680) 1, 93
- Phillips, William (1775–1828) 2
- Playfair, Lyon 1819–1898 4
- pollution *see* contamination
- ponds, dependence on springs 73
- porosity, Permo-Triassic sandstone 96–97
- potentiometer, Broughton-Edge 264
- precipitation, mineral 149–150
- pressure, barometric, influence on springs 5
- Prestwich, Joseph (1812–1896) 3–4, 5, 55, 56
- Pulsometer pump 141–142
- pumps  
 hand, West Africa 235  
 Kilsby Tunnel 109–112, *112*  
 mine  
 district 139–142  
 early 135–136  
 rag and chain 136–137, *137*, 139, *140*  
 steam-driven 138–139, *140*, 141, 150–151  
 water-powered 136, 139–141  
*see also* mines, water pumping
- Qatar, British hydrogeological work 223
- Queene’s Wells, Tunbridge 203
- quicksand 143  
 Kilsby Tunnel 109–112
- radio isotope studies 335
- radioactivity, Bath thermal springs 197
- rainfall, as a source of groundwater 93, 94
- rainwater collection, Gibraltar 252–253, *254*
- Ramsay, Andrew Crombie (1814–1891) 53, 250
- Ravensworth Close coalmill 136–137, *137*
- Reade, T. Mellard 90, 92, 94, 97–98, 99, 101
- recharge 70, 94, 96, 101, 102, 114, 244  
 artificial 7, 291, 326, 327, 335, 350–352, 368–369
- Redcar, well contamination 70
- Regional Water Authorities 296, 333, 336, 365
- reservoirs  
 Carsington Reservoir Scheme 335  
 Gibraltar 252–253, *253*
- resistivity measurement 172, 230–231, **233**, 263–268, 275

- Rhodesia, Southern, borehole siting 1933, geophysical techniques 263–268
- river authorities, data collection 328
- river basin management 332–333
- river regulation 324, 327, 328, 333, 334, 344–350, 355–356, 367–368
- Rivers Pollution Commission 5
- Roberts, Edward 248–250
- Roberts, Isaac 90, 93, 94, 95, 97, 99
- Rowzee, Dr Lodowick 203–204
- Royal Commission on Metropolitan Sewage Discharge 1882 57
- Royal Commission on Metropolitan Water Supply 1869 4
- Royal Commission on Metropolitan Water Supply 1893 57
- Royal Engineers  
development of water supply 160, 161, 169–171, 170, 172, 174, 176, 177–178  
Specialist Advisory Team 176–177  
Specialist Team Royal Engineers 178, 256
- sandstone  
New Red, as a filter 101  
Permo-Triassic 4, 89–102  
artificial recharge 327–328  
groundwater model of Robert Stephenson 1850 91–92, 116  
groundwater quality 99–101, 117  
hydraulic behaviour and properties 96–99, 116  
sources of groundwater 93–96
- sanitation, Gibraltar 247–250
- Saudi Arabia, British hydrogeological studies 222
- School of Military Engineering, Chatham 161
- Scotland  
hydropathic resorts 213–217  
chemistry 216  
geology 214–216  
water supply 183–190, 377  
contamination 213
- Scottish Environmental Protection Agency 8
- Scottish Water 8
- sea water  
contamination of groundwater 276  
*see also* contamination, saline intrusion  
as a source of groundwater 93, 94–96, 194
- Severn Tunnel 151
- sewage  
contamination 4, 5, 6, 374–375  
Gibraltar 247–248  
Liverpool 101  
London 37–47, 112  
Scotland 213
- sewers 37, 45, 46
- shaft sinking 142–147, 150  
cementation 147  
linings 142–143  
tubbing 142–146
- Shaw, Sydney Herbert (1903–1991) 263–268
- Shotton, F.W. 171–172
- Sierra Leone, borehole drilling 235
- Smith, R. Angus 101
- Smith, Bernard (1881–1936) 6, 271–272
- Smith, Richard Baird 160
- Smith, William (1769–1839) 2–3, 15–28  
caisson 17–18, 17, 19  
canal engineering 17–21  
drainage work 22–23  
embanking work 24, 26  
irrigation work 23–24  
landslip work 22  
*Mr Smith's Geological Claims* 15  
*Order of Strata* 1797 16  
stratigraphy 16, 27  
water supply work 26–28  
work at Bath 27, 196
- Snow, John (1813–1858) 4, 31–49, 48  
childhood 31–32  
medical career 32–34  
*On the mode of communication of cholera* 40  
work on cholera 36–47, 41, 42, 44, 46, 47
- Snowdown mine, chloride contamination 354
- sodium carbonate, dissolution 6
- Somerset Coal Canal (SCC) 16–17, 19, 21  
minute books 18
- South Downs Groundwater Project 339–344
- Southern Water 339–360  
Itchen River Augmentation 344–350  
South Downs aquifer management 339–344
- Southwark and Vauxhall Water Works 37, 79
- Spa, Belgium, spring water 202, 203, 211
- spas  
Bath 193–198  
Scottish 184, 186, 213–214  
Tunbridge Wells 201–212
- springs 2, 4  
in canal engineering 20  
chalybeate, Tunbridge Wells 201–211  
influence of barometric pressure 5  
Liverpool 99  
supply of water to ponds 73  
thermal, Bath 193–198
- Stephenson, George 122
- Stephenson, Robert (1803–1859) 3, 90, 91, 107–118, 108, 118  
early life 108  
London to Birmingham Railway 108–112  
Kilsby Tunnel 109–112  
London water supply 112–116  
work on groundwater in Liverpool area 91–92, 99, 100, 116–118
- Strathpeffer Spa 186, 213
- stratigraphy, work of William Smith 16–17
- Streltsova, T.D. 321
- Surface Water Survey 278
- Tailrace Level, North Pennine lead ore-field 133
- Taylor, T. John 139
- Thames Basin, wells 2, 57, 324, 327
- Thames Conservancy 324, 325, 327
- Thames, River  
sewage discharge 37, 112  
water supply 3
- Thames Tunnel 151
- Thanet Sands, artesian contours 73, 74
- Theis, C.V. 6, 275, 284, 290, 320, 321
- Thresh, John Clough (1850–1932) 6
- Tilmanstone minewater contamination 352–355

- Trevithick, Richard (1771–1833) 151  
tritium analysis 309, 329  
tubbing 142  
    cast iron 143–147  
    close topped 145–146  
Tulloch, Hector 251–252  
Tunbridge Wells  
    chalybeate springs 201–212  
    building of town 205–209, 206, 207, 208, 212  
    discovery 201–203  
    geology 209–210  
    Queene's Wells 203  
Tunnel Pit, Lancashire 133  
tunnelling 109–112, 151  
Tyne Coal Basin 139  
Tynewydd Colliery, Rhondda Valley, water inrush  
    incident 126, 147
- Underground Water Preservation Association 6  
United Arab Emirates, British hydrogeological work  
    222–223
- Walters, Rupert Cavendish Skyring (1888–1980) 6  
waste disposal 308, 309, 328, 371–377  
water, *see also* groundwater  
Water Act 1945 2, 7, 273, 276, 283–284, 289, 296, 363  
Water Act 1973 8, 296, 365–368  
Water Babies 274, 290, 297  
water closets 37  
Water Department *see* Great Britain, Geological Survey,  
    Water Department  
water industry restructuring 365–368  
water ingress, physical barriers 142–148  
water inrush 122–127, **123–126**, 147–148  
Water Research Centre 366  
water resource advisory service 297  
water resource studies 366–368  
Water Resources Act 1963 7, 278, 295, 296, 323, 364,  
    366–367  
Water Resources Board (WRB) 7, 278, 284, 295, 297,  
    323–334  
    1971–4 327–333  
    data collection 297, 328–329, 366  
    early years 1964–1971 323–327  
    *The National Plan* 327, 331–332, 367  
    northern England 326  
    Severn Trent area 326  
    Wales and Midlands 326–327  
    *Water supplies in South East England* 324  
water softening 6  
water supply 67  
    breweries 57, 185, 185  
    contaminated 4  
    London 112–116  
    maps 165, 166  
    military  
        nineteenth century 160–162  
        World War I 162–169  
        World War II 171–5  
    need for national survey 74–77  
Water Unit *see* Great Britain, Geological Survey, Water  
    Unit  
watercress growing 344, 347, 350  
watershed districts 75, 76, 77  
waterwheels 136–138, 139–141  
Watt, James, steam engine 139  
Webb, Edward (1751–1828) 16  
Weldon, Robert 17–18  
Well Record Collection 280, 289, 290  
wells  
    Abyssinian 160, 232  
    artesian 1, 2–3, 73, 82, 184  
    boring, Royal Engineers 177–178  
    Colne Valley 114  
    contamination 37–47, 57, 101  
    drilling, West Africa 232, 235  
    early records 56  
    Gibraltar 248, 249  
    hydraulics 99, 284  
    interference between 116–117  
    Liverpool 91, 99, 101, 116–118, 117  
    London 37–47, 113  
    Norton tube well 160, 161, 162, 163, 170, 254  
    sections 4, 56–57  
    Thames Basin 2  
    United Kingdom, data collection 273–274, 290, 297,  
        305  
    West Africa 232  
    work of Robert Stephenson 114  
    work of William Whitaker 56–58  
Western Front, World War I, water supply 162–167, 163,  
    164, **166**, 167  
Wet Earth Colliery, Lancashire 128  
Whitaker, William (1836–1925) 4–5, 51–63, 60  
    bibliographical publications **58**  
    career in Geological Survey 52–56  
    character 61–62  
    childhood 51–52  
    *Cliffs and Escarpments of the Chalk and Tertiary*  
        *Strata* 54, 56  
    contributions to learned societies 58–59  
    Geological Society Memoirs **55**  
    *Geology of London and of part of the Thames Valley*  
        55  
    *Guide to the Geology of London and Neighbourhood*  
        53, 56  
    hydrogeology 56–58  
    *Subaerial Denudation* 54, 56  
    water supply County Memoirs **61**  
    water supply papers **60**  
Woburn, drainage 23–24  
Woodward, Horace Bolingbroke (1848–1914) 6  
World War I, water supply 162–169  
World War II, water supply 171–175  
    East Africa 171  
    Gibraltar 255  
    Normandy 172, 174  
    North Africa 171–172, 220, 221  
    Scotland 186–187  
    UK water resources 171, 272  
    work of Stevenson Buchan 289
- Yellow Sands, Permian, Durham Coalfield 143–146  
Yemen, British hydrogeological work 224  
Zimbabwe *see* Rhodesia, Southern