The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. The main title is centered in a large, bold, black, sans-serif font.

WHAT IN THE WORLD ARE WE DOING ABOUT OUR FRESH WATER RESOURCES ?

WILLIAM H. SCHRAMM, GEORGE LOSONSKY

13TH ANNUAL WATER CONFERENCE

APRIL 15-16 2019

WHO NEEDS WATER?

- **40% OF THE WORLD POPULATION IS AFFECTED BY WATER SCARCITY**
- **70% OF ALL WATER RESOURCES ARE USED IN AGRICULTURE**
- **70% OF ALL DEATHS FROM NATURAL DISASTERS ARE WATER RELATED**
- **80% OF USA IS SUPPLIED BY SURFACE WATER**
- **50% OF POPULATION RELIES ON GROUNDWATER, RURAL USE IS 99% GROUND WATER**

WORLD CITIES AT RISK



- MEXICO CITY HAS RUNNING WATER ONLY PART OF DAY
 - 1 IN 5 HAS TAP WATER A FEW HOURS A WEEK
- JAKARTA, INDONESIA GROUND WATER EXTRACTION CAUSES SUBSIDENCE
 - OCCURS FASTER THAN SEA LEVEL RISE
- SAO PAULO, BRAZIL WATER RESERVOIRS DEPLETED IN 2015
 - PIPES DREW IN MUD
 - WATER TAPS TO HOMES REDUCED TO A FEW HOURS PER WEEK
 - EMERGENCY WATER TRUCKS LOOTED
 - LAST MINUTE RAINS PREEMPTED COMPLETE CLOSURE OF TAPS



An aerial photograph of Cape Town, South Africa, showing the city built on a plateau, surrounded by mountains and the ocean. The water is a clear turquoise color. The text is overlaid on the image.

DAY ZERO CAPE TOWN SOUTH AFRICA 2015-18

- **CAPE TOWN IS AN OASIS SURROUNDED BY DESERT/ MEDITERRANEAN CLIMATE SIMILAR TO SOUTHERN CALIFORNIA**
- **MOUNTAINS TRAP OCEAN MOISTURE; FEEDS RIVERS AND FILLS AQUIFERS**
- **POPULATION GROWTH IN CAPE TOWN DEMANDS ADDITIONAL WATER SOURCES**
- **CLIMATE CHANGE IS PROJECTED TO REDUCE RAINFALL AND AQUIFER RECHARGE**

DAY ZERO CAPE TOWN SOUTH AFRICA 2015-18

- VOLUNTARY WATER USE RESTRICTIONS SET AT 50 LITERS PER DAY
 - LESS THAN 1/6 OF WHAT AMERICAN USES
 - LESS THAN 1/2 OF CITIZENS COMPLY
 - POOLS, GARDEN WATERING, AND CARWASHES ARE ILLEGAL
 - WATER THEFT PATROLS ENFORCED AT NATURAL SPRINGS

- THE CITY MAY DECLARE DAY ZERO WITH MANDATORY 25 LITERS PER DAY LIMIT
 - DAILY RATION EQUALS 4 MINUTES OF SHOWER – NOTHING LEFT TO USE
 - CITY HAS PREPARED 200 EMERGENCY STATIONS OUTSIDE OF GROCERIES AND OTHER GATHERING SPOTS
 - EACH STATION WOULD HAVE TO SERVE 20,000 RESIDENTS

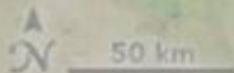


January 7

February 10

DAY ZERO IN AUSTRALIA ?

- **AUSTRALIA HAS THE GREATEST RAINFALL VARIABILITY OF ANY COUNTRY IN THE WORLD**
 - **3 WET PERIODS IN LAST 130 YEARS – LONGEST DRY PERIOD 1900-1944**
 - **POPULATION WENT FROM 3.8 TO 7.5 MILLION DURING THIS DRY PERIOD.**
 - **TODAY POPULATION IS 21 MILLION**
 - **MURRAY RIVER AVERAGE RUNOFF 11,000 BILLION LITERS, VARIES FROM 1,670 TO 30,000 BILLION PER YEAR**
 - **12% OF RAINFALL FLOWS AS SURFACE WATER, THE REST EVAPORATES**
- **AUSTRALIA HAS THE GREATEST DOMESTIC WATER FOOTPRINT PER CAPITA IN THE WORLD**
 - **AVERAGE HOUSEHOLD OF 4 PEOPLE CONSUMES 330,000 LITERS PER YEAR**
 - **USES ANOTHER 2,700,00 LITERS PER YEAR (1/2 USED FOR FOOD PRODUCTION)**
 - **A SINGLE ALMOND PLANTATION WITH 500,000 TREES USES 16,000,000 LITERS PER HECTARE**
 - **6 LITERS PER ALMOND ????**



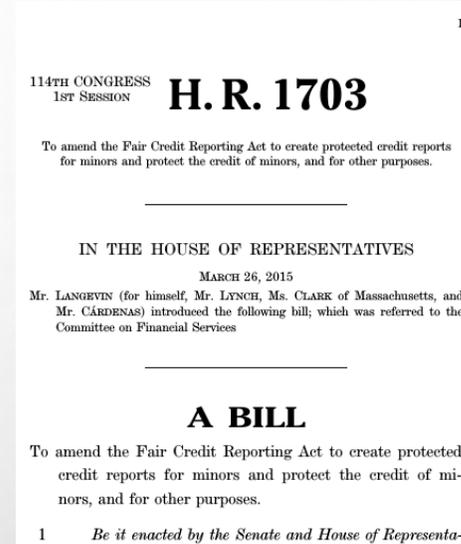
DAY ZERO AVERTED IN PERTH, AUSTRALIA

- PREVIOUSLY RELIANT ON DAMMED RESERVOIRS
 - RAINFALL HAS DECLINED 20% SINCE THE 1970'S
 - WATER SUPPLY INTO RESERVOIRS HAS DECLINED FROM 300 BILLION TO 25 BILLION LITERS PER YEAR
- GROUND WATER IN LARGE PORTIONS OF AUSTRALIA IS SALINE
- PERTH WATER CORPORATION HAS DEVELOPED ALTERNATIVE WATER SUPPLIES
 - SEA WATER DESALINATION PLANTS
 - 1 TRILLION LITERS PRODUCED – THREE YEARS OF DEMAND
 - MELBOURNE HAS BUILT A PLANT IN RESERVE BUT NOT IN USE
 - TREATED WASTE WATER INJECTED INTO AQUIFERS FOR REUSE AS DRINKING WATER



ATTEMPTS TO MANAGE WATER RESOURCES

- STATE POLICIES
- REGIONAL COMPACTS
- FEDERAL/NATIONAL POLICIES/REGULATIONS
- UNITED NATIONS STUDIES/ADVISORIES
- NGO INITIATIVES TO BE SMARTER USERS AND LIMIT INDUSTRIAL USE OF HIGH QUALITY WATER



US WATER LAW FRAMEWORK

- RIPARIAN RIGHT – ALLOCATED TO THOSE POSSESSING LAND ALONG WATER (EASTERN USA)
- RIGHT OF CAPTURE – FIRST PERSON TO “CAPTURE” OWNS IT (WESTERN USA)
- NEGOTIATED/MANDATED RESTRICTIONS TO PROVIDE FOR GREATER GOOD
 - SETS LIMITS ON APPROPRIATION OF NEW INSTREAM FLOW RIGHTS WITHIN MULTI-STATE COMPACT
 - LIMITS FUTURE INCREASE OF WATER USE BY ESTABLISHING INSTREAM RIGHTS
 - PREVENTS FUTURE APPROPRIATION OF WATER
 - MAINTAINS MINIMUM WATER LEVEL FOR POWER PRODUCTION
- DROUGHT CONTINGENCY PLANS BASED ON 1922 COLORADO RIVER COMPACT
 - AUTHORIZED STORAGE OF CONSERVED WATER
 - ESTABLISH DEMAND MANAGEMENT PROGRAM
 - INCENTIVIZED VOLUNTARY CONSERVATION
 - PREDETERMINED RESERVOIR ELEVATIONS



COLORADO RIVER DROUGHT CONTINGENCY PLAN

- MULTI-STATE AGREEMENT TO MANAGE LIMITED RESOURCE
 - AGRICULTURE
 - DRINKING WATER SUPPLY
 - POWER GENERATION
- PARTICIPATING STATES
 - WYOMING
 - NEVADA
 - UTAH
 - COLORADO
 - CALIFORNIA
 - ARIZONA
 - NEW MEXICO



OTHER FORMS OF WATER POLICY

- CHILE: DIRECCIO'N GENERAL DE AGUAS (DGA)
 - RESPONSIBLE FOR MAINTAINING MINIMUM STREAM FLOWS
 - LEGAL AUTHORITY LIMITED BY CHILEAN CONSTITUTION
 - WATER RIGHT REQUESTS MUST BE GRANTED IF WATER IS AVAILABLE
 - WATER RIGHTS SOLD AT AUCTION TO HIGHEST BIDDER IF INSUFFICIENT SUPPLY FOR ALL REQUESTS
 - WATER RIGHTS CONSIDERED PRIVATE PROPERTY
 - DGA CAN NOT RESTRICT RIGHTS BUT MAY BUY THEM BACK



WHERE DOES THE FUTURE LEAD US ?

- IS A NATIONAL WATER POLICY POSSIBLE IN OUR LIFETIME OR EVER ?
- IS ONE NECESSARY ?
- DO WE HAVE A POSITIVE OUTLOOK FOR AN EXPANDING POPULACE ?
- ARE THERE TECHNOLOGIES AVAILABLE TO PROVIDE WATER AS WORLD POPULATION GROWS ?
 - WHO WILL BE ABLE TO AFFORD THE NECESSARY TECHNOLOGIES TO SURVIVE ?
- AT WHAT POINT WILL THE POPULATION EXCEED OUR ABILITY TO PROVIDE CLEAN WATER ?
- IS INTERNATIONAL COORDINATION OF RESEARCH AND POLICY DEVELOPMENT NEEDED ?
 - WATER SHORTAGE IMPACT IS AT LEAST AS IMMEDIATE AS CLIMATE CHANGE
- IS SUSTAINABILITY POSSIBLE ?





“THE TECHNOLOGY IS THERE TO TREAT ANY WATER - WASTE WATER,
STORM WATER, ANY KIND OF WATER CAN BE TREATED TO
PERFECTION” - UNIVERSITY OF WESTERN AUSTRALIA PROFESSOR OF
ENVIRONMENTAL ENGINEERING - ANAS GHADOUANI

CAN WE PRODUCE ENOUGH ?

AT WHAT COST ?

WHO GETS IT ?





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