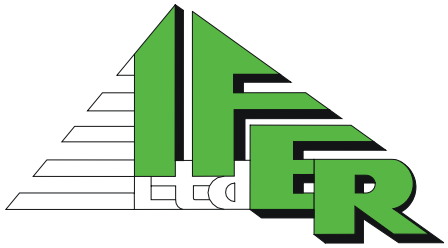
Inventory of Water Resources, Infrastructure and Sanitation on Cape Verde

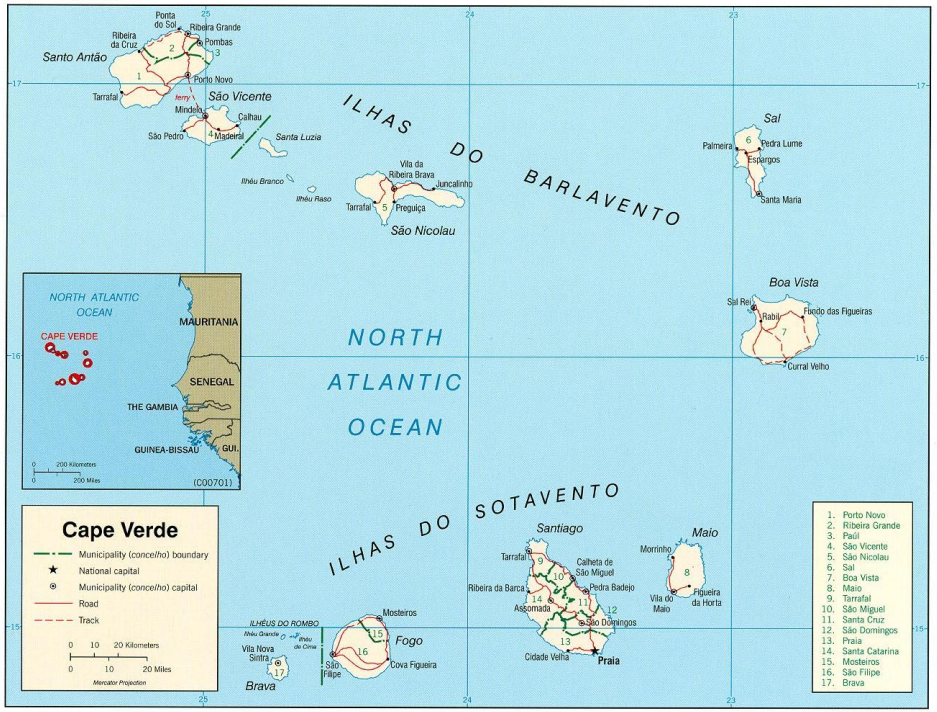


IFER – Monitoring and Mapping Solutions Ltd.

http://www.field-map.com

Introduction

- 9 inhabited islands located in central Atlantic Ocean, 570 km off the coast of Western Africa (~4000 km^2)
- Population of 525 000
- Predominate very dry climate
- Extreme water scarcity
- Total wood volume of 960 000 m3
- Forest and woodland area of 89ths ha
- Mean growing stock of 10.6 m3/ha



WASH Project
(Water, Sanitation, and Hygiene Project)

- reforming national policy and regulatory institutions
- transforming inefficient utilities into independent corporate entities operating on a commercial basis
- improving the quality and reach of water and sanitation infrastructure
- Funded by US Millennium Challenge Corporation (MCC) – USD 41.1mil
- National Water and Sanitation Agency (ANAS) is responsible for policy and planning of all water resources, water supply services and collection and treatment of waste water and solid waste

ANAS
Agência Nacional de Água e Saneamento

Mission goals

- Design, prepare and launch system for data collection of different water infrastructure on Cape Verde. The system is based on the technology Field-Map
- Collect existing data about water resources in one central database
- Train local staff in using and maintaining of the above mentioned system
- Deliver and install all necessary components of the system (software and hardware)

Mission phases

- *Developing of methodology*
- Application of Field-Map technology (software and hardware)
- Developing of database structure
- Training of the ANAS staff (Field-Map experts)
- Project validation in the field
- Training of the ANAS staff (field team)
- Setup of synchronization server
- *Data collection and processing*
- *Continuous water infrastructure monitoring and management*

Methodology

- Developed by external consultant
- 4 basic types of water infrastructure objects:
  - Clean water retention (e.g. wells, dams)
  - Water supply systems (e.g. pumping and desalination stations)
  - Residual waters (e.g. wastewater treatment stations, septic tanks)
  - Monitoring (e.g. water level meters, flow meters)
- Each type is divided to subtypes (23 in total)
- Each subtype has set of attributes for object definition and monitoring

Field-Map Project Manager (Copyright © 1999-2015 IFER Ltd., version X4.1.7065)

Project Layers Tools Extensions Synchronization Developer Options Help

Layers

- Plots (Ilha)
  - Infrastructure (Infraestrutura)
    - WaterMonitoring (Monitoramento da Água)
      - WaterLevel (Nivel estatico)
      - WaterVolume (Volume de água)
      - WaterConductivity (Analisis de campo)
      - WaterChemistry (Química da água)
    - Management (Gestão)
    - Conservation (Estado da infraestrutura)
      - Fence (Vedação)
    - Characteristics (Características)
      - WaterPoint (Caracteristicas do ponto de Água)
      - Dam (Caracteristicas Águas superficiais)
      - WaterLevels (Chegada de Água)
      - Drains (Drenos)
      - PumpTest (Ensaio)
      - PumpStation (Estação elevatória)
      - PipeLine (Conduta de água)
      - ResidualWater (Águas residuais)
        - Treatement_equipement (Grau de tratamento)
      - MeasurInstruments (Instrumentos de medição)
      - Tank (Reservatório)
      - SepticTank (Fossa séptica)
        - CleaningDates (Data da limpeza)
      - Collector (Colector)
      - Trench (Vala)
      - Pump (Bomba)
      - ElecticInstall (Alimentação eléctrica)
      - WaterTreatment (Estaçao deTratamento)
        - TreatmentType (Tratamento potabilização)
      - Distributionpoint (Ponto de distribuiçao)
    - Lithology (Litologia)
    - Economy (Economia)
    - Socioeconomic (Dados socioeconómicos)
      - ServedAreas (Zonas servidas)
    - Fotos (Fotografias)
  - LineInfrastructure (Condutas)
    - LineManagement (Gestão)
    - LineConservation (Estado da infraestrutura)
    - PipeLines (Conduta de água)
    - Colectors (Colector)
    - Trenchs (Vala)
  - Watershed (Bacia)
  - Neighborhood (Bairro/Lugar)

Layer attributes | Layer options | Layer scripts | Layer description

Layer attributes of "Infrastructure (Infraestrutura)"

Attribute name	Attribute type	Required	Visible	Label
WatershedName	String	Yes	Read-only	Bacia
WatershedCode	String	Yes	Read-only	Codigo do bacia
GridNumber	String	Yes	Read-only	Grid número
Geology	String	Yes	Non-visible	Geologia
InfrastructureCategory	Lookup list (numeric ID)	Yes	Visible	Categoria infraestrutura
InfrastructureType	Cond.lookup list (num ID)	Yes	Visible	Tipo de infraestrutura
CaptacaoOrigem	Cond.lookup list (num ID)	Yes	Visible	Captaçao origem
Elevation_m	Number	Yes	Visible	Quota (m)
Code1	String	Yes	Visible	Código 1
Code2	String	Yes	Visible	Código 2
Code3	String	Yes	Read-only	Código 3
Validated	Lookup list (numeric ID)	Yes	Visible	Validado
LabelCode	String	No	Non-visible	Código
Aquifer	Cond.lookup list (num ID)	Yes	Visible	Aquifero
Monitoring	Cond.lookup list (num ID)	Yes	Visible	Monitorização
Filter	Button	Yes	Visible	Filtro de dados
Dummy4NewPoint	Number	Yes	Non-visible	
RGB	String	Yes	Non-visible	
FindIncomplete	Button	Yes	Visible	Olhar registros incompletos
InfrastructureSymbol	Lookup list (numeric ID)	Yes	Non-visible	Símbolo de infraestrutura
MeasureType	Lookup list (numeric ID)	Yes	Non-visible	

Attribute definition | On-Change script | On-Validate script | Attribute description | Attribute color

Lookup list: (qconInfrastructureType) (local) (master attribute: InfrastructureCategory)

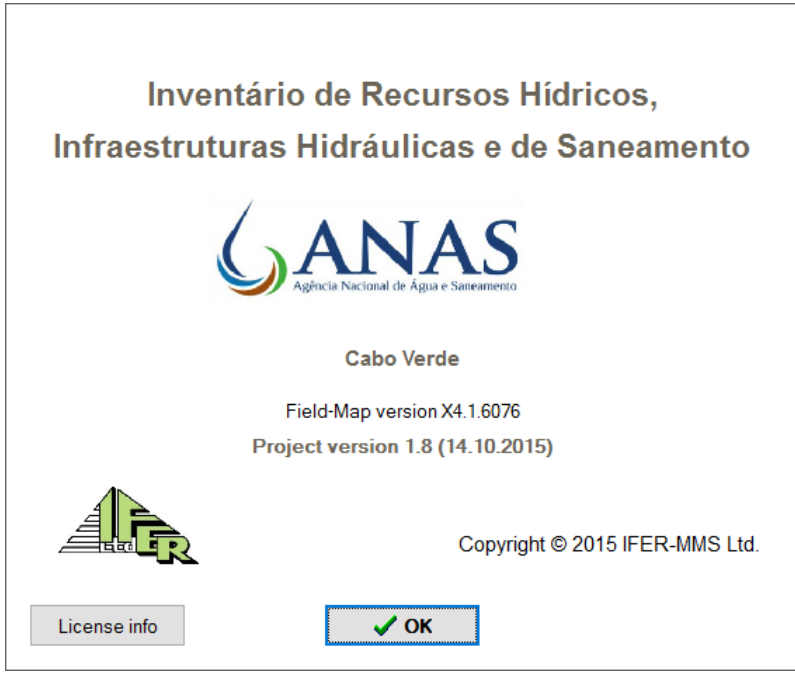
Master	ID	Value	Active	Order
Captação	1	Furo	Yes	
Captação	2	Galeria	Yes	
Captação	3	Nascente	Yes	
Captação	4	Poço	Yes	
Captação	5	Dique de captaçao	Yes	
Captação	6	Barragem	Yes	
Captação	7	Espelho de captaçao	Yes	
Captação	8	Dique de retençao	Yes	

Order by:

Project: D:\Data\Field-Map\Projekty\CapeVerde\ANAS\ANAS_FM_training [FIREBIRD_LOCALDB] (anas)

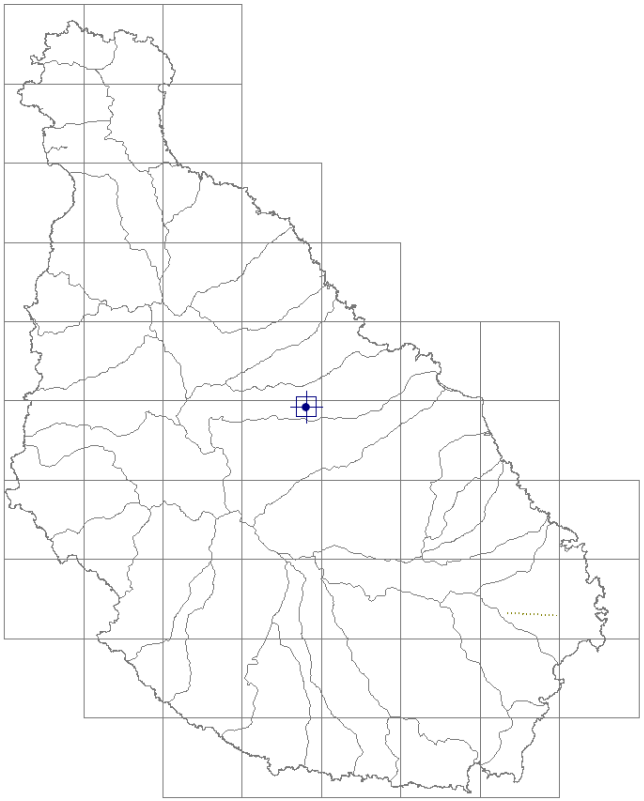
Extending functionality through scripting = new Field-Map application

- Attribute visibility settings
  - High count of attributes
  - Each attribute is visible only for some of the infrastructure object types
  - Attribute visibility settings are defined in Excel table and loaded to Field-Map if these settings change
- Custom scripts for checking data
- Filtering tools

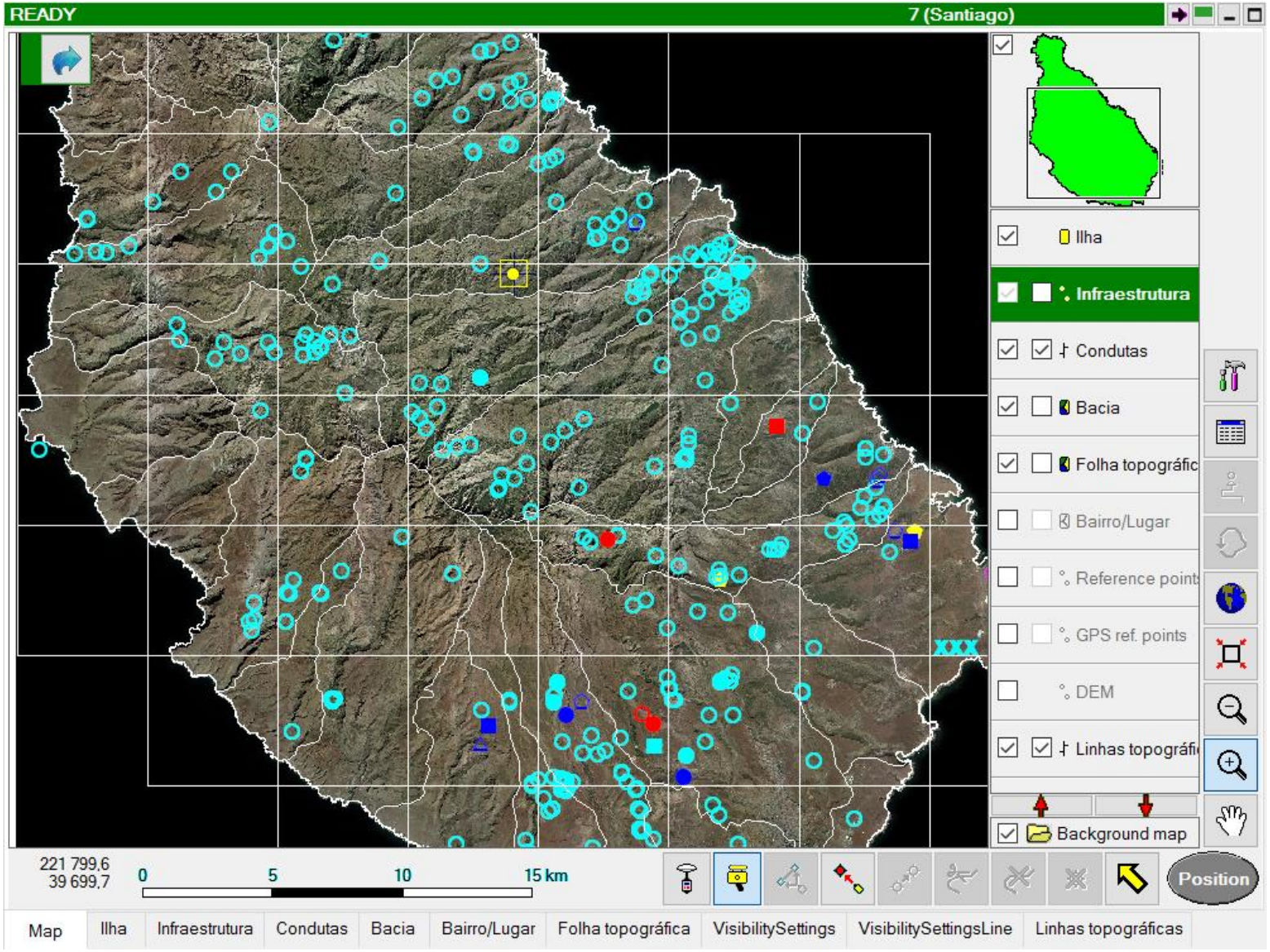


Preparing of database

- 9 plots – each representing one island
- Each island is further divided by grid, watersheds and municipalities
- Layers with descriptive data for infrastructure objects
- Layers for recording repeated measurements



Import of existing data



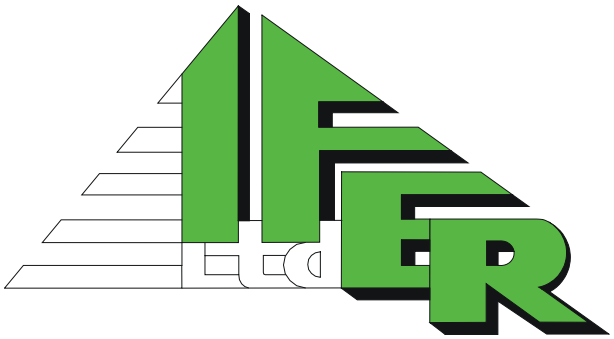
Software and Hardware

- Field-Map Project manager
- Field-Map Data Collector (with synchronization)
- 4/8 Getac T800 computers using internal GPS for positioning

Trainings

- 2 Field-Map experts to process data and develop the project further
- Field workers

Expected results

- Complete inventory of water resources, water infrastructure and sanitation infrastructure
- Integral data for future infrastructure management and planning
- Continuous monitoring of groundwater levels

Thank you for your attention