Package ‘RSSOP’

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RSSOP-package

Tools for Operation of Reservoirs Systems using Standard Operation Policy

Description

RSSOP

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The package provides functions to establish the reservoirs systems elements and build up an operation standard operation policy (SOP) releases. The package include S3 classes for reservoir(s) system operation. Methods such as plot and yield is available for standard objects inherited from class SOP for results illustration and visualization.

Author(s)

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References


addObjectToArea

Adds An Object To The Area

Description

Adds an object to the an object inherited from class createArea
addObjectToArea

Usage

addObjectToArea(area, object, type)

Arguments

area an object inherited from creatArea class
object an object to be added to area
type type of the object to added to area: "reservoir", "demand", "hydrometeorology"

Value

an object inherited from class of creatArea

Author(s)

Rezgar Arabzadeh, Parisa Aberi, Kaveh Panaghi

Examples

# Create an area
object<-createArea(name ="Zarineh"
location="kurdistan",
start =c(1900,1)
end =c(1962,1))

# Create an Agricultural demand site
var<-sin(seq(0.2,pi-0.2,length.out=12))%*%100/sum(sin(seq(0.2,pi-0.2,length.out=12)))
dem<-createDemandSite(type="agricultural"

demandName="Agri"

demandCode=1
annualUseRate=1.3084
annualVariation=var
area=1000
cycle=TRUE
numberOfCycles=62
supplierCode=1
downstreamCode=0
priority=1)

# Create a Reservoir
AV<-data.frame(A=seq(2,30,length.out=10),
V=seq(100,700,length.out=10))
res<-createReservoir(type ="storage",
name ="Bukan",
reservoirCode =1,
downstreamReservoirCode=0,
geometry =list(sMin =100, sMax =700),
volumeArea=AV)

# Create a meteorological object
met<-hydrometeorology(Inflow =rlnorm(744,2,0.2),
netEvaporation=runif(744,0,0.2),
reservoirCode =1)

# add object to The area
object<-addObjectToArea(area =object,
    object=met,
    type ="hydrometeorology")
object<-addObjectToArea(area =object,
    object=dem,
    type ="demand")
object<-addObjectToArea(area =object,
    object=res,
    type ="reservoir")

createArea

A Function To Create The Reservoirs System Area

Description
it creates an area to operate reservoirs inside it

Usage
createArea(name = "unknown", location = "unknown", start = c(), end = c())

Arguments

name a string representing the name of the operating area
location a string representing the location of the operating area
start a vector whose first number presents the number of start month of simulation
time and second number shows the start year of of simulation time
end a vector whose first number presents the number of end month of simulation
time and second number shows the end year of of simulation time

Value
an object of class of createArea

Author(s)
Rezgar Arabzadeh, Parisa Aberi
createDemandSite  

**Description**

A function to create a demand site using demand pattern variation or time series

**Usage**

```r
createDemandSite(type = "agricultural",
                 demandName = "Agr1",
                 demandCode,  
                 annualUseRate, 
                 annualVariation, 
                 area, 
                 cycle = FALSE, 
                 numberOfCycles = NULL, 
                 supplierCode, 
                 downstreamCode, 
                 priority = 1,  
                 start = 1900)
```

**Arguments**

- **type**: domestic, agricultural, and environmental. the hydropower is not available in this version
- **demandName**: a string name of the desired demand site
- **demandCode**: a unique integer number
- **annualUseRate**: the amount of water consumption per unit of area during a year
- **annualVariation**: a vector, in percent, of demand site variation during a year. the summation of vector’s element should be equal to 100
- **area**: for agricultural type: the area of demand site
- **cycle**: logical, cycle the time series?
- **numberOfCycles**: if cycle is TRUE, number of cycles
- **supplierCode**: the code of reservoir which is going to supply this demand site
- **downstreamCode**: the downstream of demand site
- **priority**: the priority of supply
- **start**: the start year

**Value**

an object inherited from class createDemandSite
**createReservoir**

*Create A Reservoir Object*

**Description**

This function creates a reservoir object using geometrical specifications.

**Usage**

```r
createReservoir(type = "storage",
               name = "reservoir1",
               reservoirCode = 1,
               downstreamReservoirCode,
               geometry = list(sMin=NULL, sMax=NULL, volumeArea=NULL))
```

**Arguments**

- `type` (required): the type of reservoir, "storage" and "hydropower". Hydropower is not available in this version.
- `name` (required): a string representing the name of reservoir object.
- `reservoirCode` (required): an unique integer code.
- `downstreamReservoirCode`: the code of reservoir downstream.
- `geometry` (required): a list, include maximum and minimum volumes of reservoir and a data frame for volume-area rating curve whose first column includes area (square KM) and the second column is Volume (MCM).

**Value**

An object inherited from class `createReservoir`.

**Author(s)**

Rezgar Arabzadeh, Parisa Aberi, Kaveh Panaghi
**hydrometeorology**  
*Creates A Meteorological Object*

**Description**

this function creates an hydrometeorological object include stream flow and evaporation time series

**Usage**

```r
hydrometeorology(Inflow,  
netEvaporation,  
cycleEvaporation = FALSE,  
numberOfCycles = NULL,  
startDate = c(1900, 1),  
reservoirCode)
```

**Arguments**

- **Inflow**  
  Inflow time series (MCM)

- **netEvaporation**  
  Net evaporation in (m)

- **cycleEvaporation**  
  logical, the net evaporation should be cycled or not

- **numberOfCycles**  
  an integer number: if cycleEvaporation is TRUE, the number of cycles. If is not specified it would be calculated based on the Inflow time series

- **startDate**  
  a vector of two elements whose elements include start year and start month respectively

- **reservoirCode**  
  the code of reservoir which this hydrometeorological object belongs to that

**Value**

an object from class of hydrometeorology

**Author(s)**

Rezgar Arabzadeh, Parisa Aberi
**plot.SOP**

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**object**

*An Object From Class Of creatArea*

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**Description**

an object from the class of createArea which includes the specifications of a cascade reservoir system in Kurdistan, ZerineRud basin. "object" includes two inflow time series in the Bukan and Sonata dam sites, there demands sites time series and geometrical specifications of mentioned dams

**Usage**

data("object")

**References**


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**plot.SOP**

*A Plot Function for Object Inherited From Class Of SOP*

---

**Description**

a plot function for an object inherited from class SOP

**Usage**

```r
## S3 method for class 'SOP'
plot(x , ...)
```

**Arguments**

- `x` : an object inherited from class SOP
- `...` : other objects that can passed to plot function

**Author(s)**

Rezgar Arabzadeh, Parisa Aberi, Kaveh Panaghi
**SOP**

*Standard Operation Policy*

---

**Description**

function for reservoir(s) system(s) operation using Standard Operation Policy

**Usage**

SOP(object)

**Arguments**

- **object**: an object from class of createArea

**Value**

an object inherited from class SOP

**Author(s)**

Parisa Aberi, Rezgar Arabzadeh, Shahab Araghinejad

**References**


**Examples**

```r
# loading an area
data (object)
## Not run: res<-SOP(object)
## Not run: plot(res)
## Not run: Yeild(res)
```

---

**SOP.base**

*Base Function For Class SOP*

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**Description**

SOP base function for class SOP

**Usage**

```r
## S3 method for class 'base'
SOP(object)
```
Arguments

object an object inherited from class creatArea

Author(s)

Rezgar Arabzadeh, Parisa Aberi

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SOP.default  

Default Function Class Of SOP

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Description

SOP default function of class SOP

Usage

## Default S3 method:
SOP(object)

Arguments

object an object inherited from class createArea

Author(s)

Rezgar Arabzadeh, Parisa Aberi

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Yeild  

Reservoir Performance Indices

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Description

a function for evaluation and calculation of reservoir performance indices based on Hashimoto et al. (1982)

Usage

Yeild(object, s.const = 0.95)

Arguments

object an object inherited from class SOP
s.const satisfactory constant of supplying
Value

a matrix presenting Reliability, resiliency, and vulnerability criterion for water resource system performance evaluation

Author(s)

Rezgar Arabzdadeh, Parisa Aberi

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