Case 4

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Bangladesh: tropical cyclones and stormsurges, heavi precipitation.

Bangladesh is highly vulnerable to climate induced hazrds and disasters and its coastal part are mostly threatened for the impacts of climate change in case of cyclone, storm surges, flood, salinity and tsunami disaster. Even last twenty years the coastal peoples have suffered due to super cyclone SIDR and AILA devastations. Last two deacdes a lots of disaster coping interventions have been provided to the community to achieve resiliency in this areas. So really it will be a field laboratory for the research of Disaster Resilience and Climate Change: Science and innovation for adaptation to climate change: from assessing costs, risks and opportunities to demonstration of options and practices.

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

```
library(esd)
```

```
## Loading required package: ncdf4
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
##
## Attaching package: 'esd'
```

```
## The following object is masked from 'package:base':
##
##     subset.matrix
```

Analysis

Scale the precipitation according to the indidividual wet-day mean. Then take the mean of the station series to get an index of large-scale precipitation intensity.

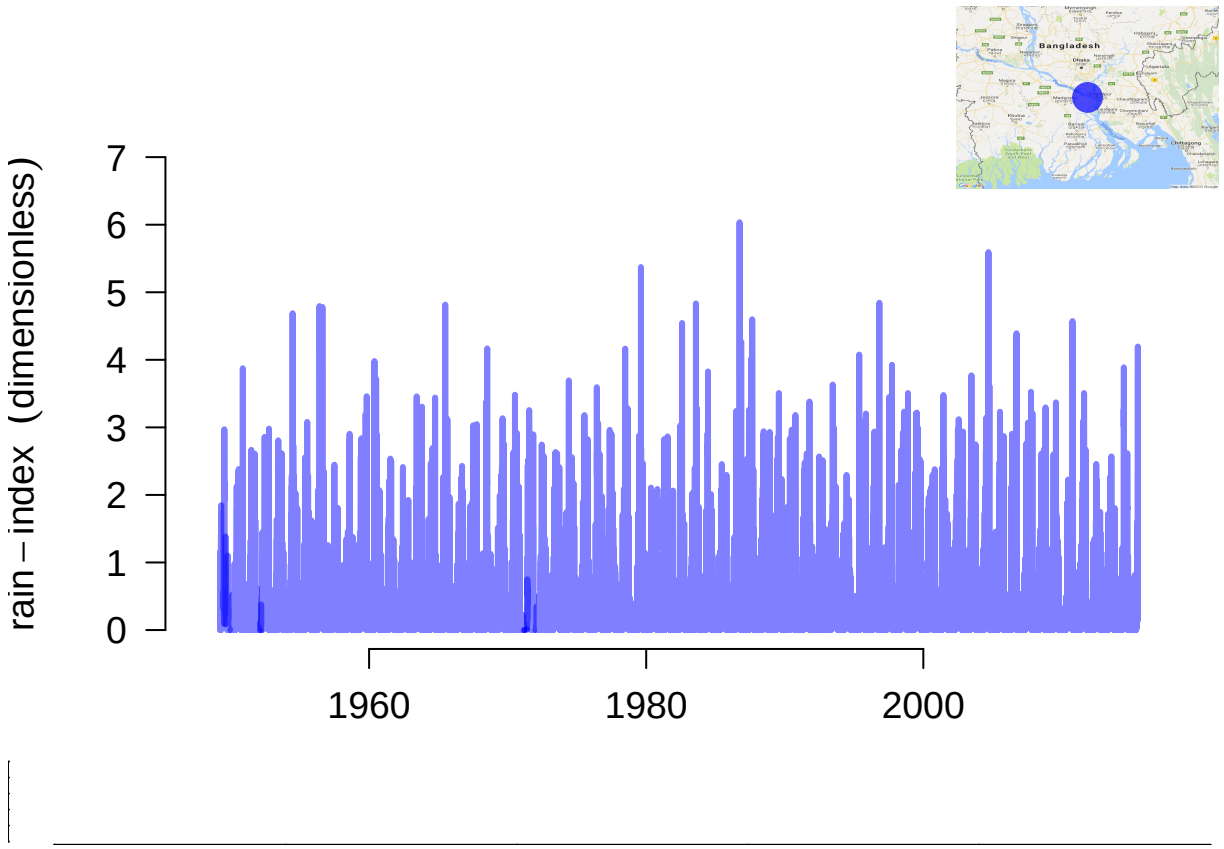
```
mu <- apply(coredata(pr.bmd),2,'wetmean')
nv <- apply(coredata(pr.bmd),1,'nv')
X <- zoo(rowMeans(t(t(pr.bmd)/mu),na.rm=TRUE),order.by=index(pr.bmd))
X[nv < 11] <- NA
X <- as.station(X,param='rain-index',unit='dimensionless',loc='Bangladesh',
                lon=mean(lon(pr.bmd)),lat=mean(lat(pr.bmd)),alt=0)
```

Examine the index:

```
plot(X,new=FALSE)
```

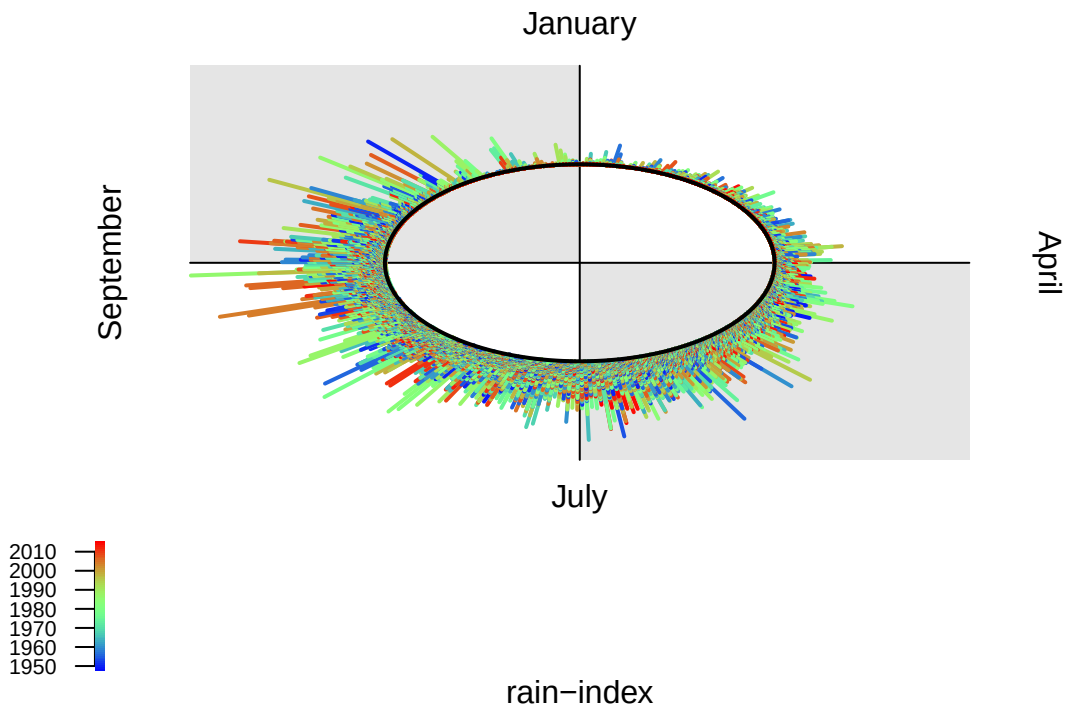
```
## Loading required package: RgoogleMaps
```

```
## Warning in plotmap(lat(x), lon(x), bgmap, pch = 19, col = col, cex = 2):
## NAs introduced by coercion
```



Check the seasonality

```
wheel(X,new=FALSE)
```

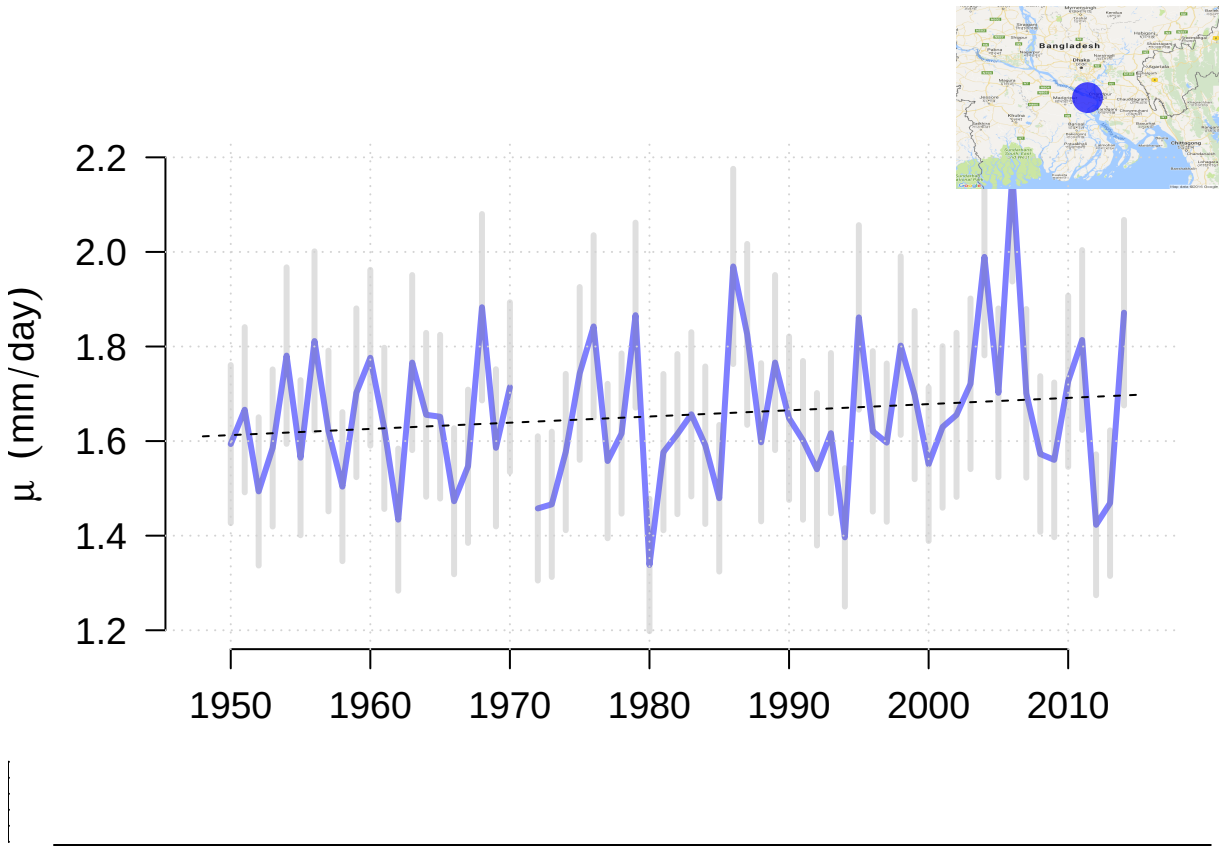


The long-term perspective of the rainfall intensity

```
plot(annual(X,'wetmean'),new=FALSE)
```

```
## Warning in plotmap(lat(x), lon(x), bgmap, pch = 19, col = col, cex = 2):
## NAs introduced by coercion
```

```
grid()
lines(trend(annual(X,'wetmean')),lty=2)
```

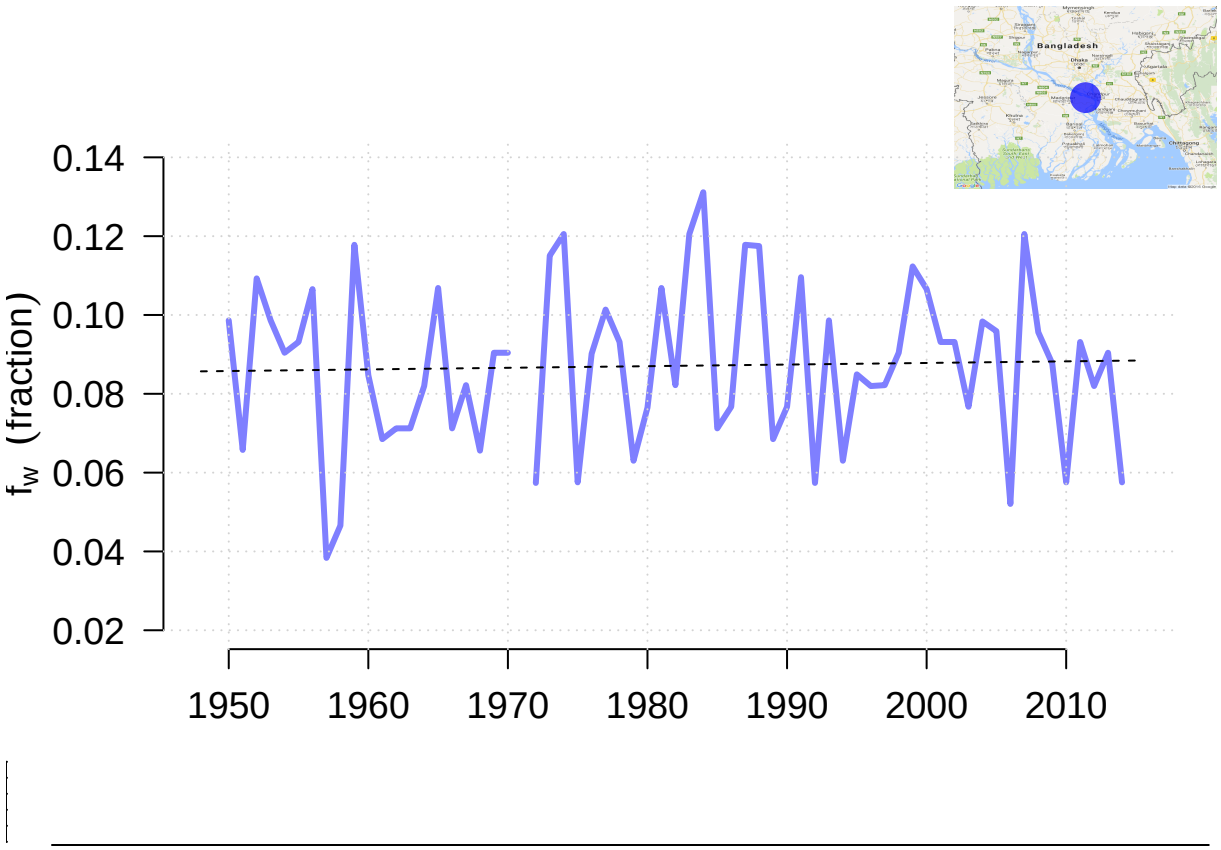


The long-term perspective of the wet-day frequency

```
plot(annual(X,'wetfreq'),new=FALSE)
```

```
## Warning in plotmap(lat(x), lon(x), bgmap, pch = 19, col = col, cex = 2):
## NAs introduced by coercion
```

```
grid()
lines(trend(annual(X,'wetfreq')),lty=2)
```


Bangladesh
0.14
0.12
0.10
0.08
0.06
0.04
0.02
f_w (fraction)
1950
1960
1970
1980
1990
2000
2010