Final_Project

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```
# Install required packages
# install.packages(c("sf", "ggplot2", "dplyr", "rnaturalearth", "rnaturalearthdata", "kableExtra"))

# Load libraries
library(sf)
```

```
## Linking to GEOS 3.11.0, GDAL 3.5.3, PROJ 9.1.0; sf_use_s2() is TRUE
```

```
library(ggplot2)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(rnaturalearth)
library(rnaturalearthdata)
```

```
##
## Attaching package: 'rnaturalearthdata'
```

```
## The following object is masked from 'package:rnaturalearth':
##
##     countries110
```

```
library(kableExtra)
```

```
##
## Attaching package: 'kableExtra'
```

```
## The following object is masked from 'package:dplyr':
##
##     group_rows
```

A map showing where in the world it is located.

This section loads a world map and highlights Fiji's location with its geographical coordinates (latitude: -17.7134, longitude: 178.0650). A red dot marks Fiji on the map.

```
# Load world map data
world <- ne_countries(scale = "medium", returnclass = "sf")

# I chose Fiji as my Island State for this project
# Define Fiji's coordinates
fiji_coords <- tibble(
  name = "Fiji",
  lat = -17.7134,
  long = 178.0650
)

# Plot the world map with Fiji's location
world_map <- ggplot(data = world) +
  geom_sf(fill = "lightblue", color = "gray") +
  geom_point(data = fiji_coords, aes(x = long, y = lat), color = "red", size = 3) +
  labs(
    title = "Location of Fiji in the World",
    x = "Longitude",
    y = "Latitude"
  ) +
  theme_minimal()

print(world_map)
```

A map of the island.

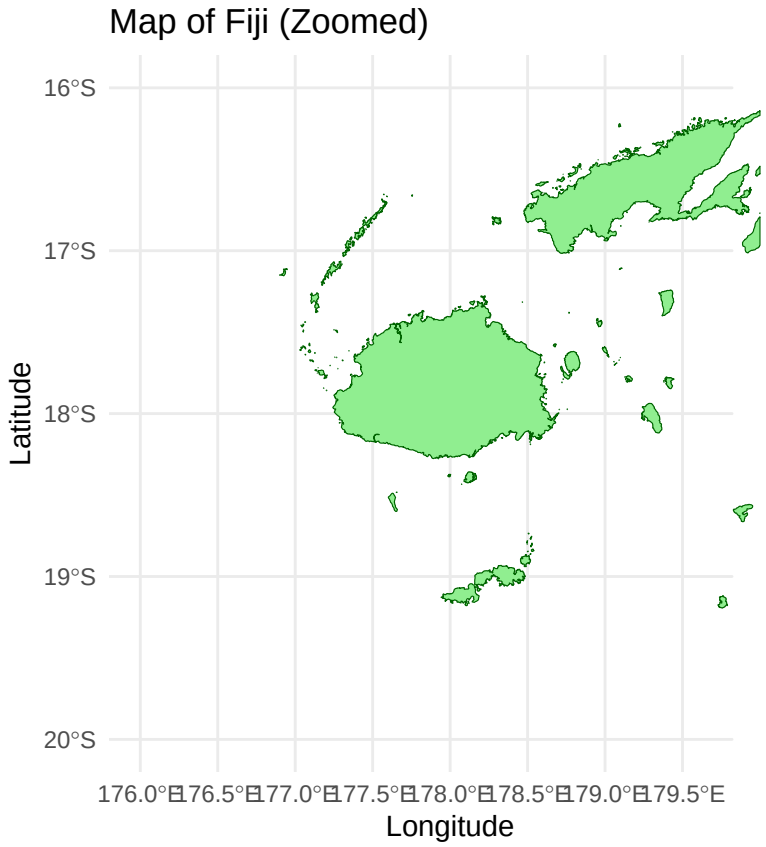
A detailed map of Fiji with its boundaries highlighed, filled in light green to depict its landmass.

```
# Load Fiji's shapefile
# Download the administrative boundary shapefile for Fiji from IGISMAP website
fiji_shapefile <- st_read("gadm41_FJI_0.shp")
```

```
## Reading layer ‘gadm41_FJI_0’ from data source
##   ‘/Users/jie/Library/CloudStorage/OneDrive-BostonUniversity/Main Folder/02 Courses/PhD (BU)/2024 Fa
##   using driver ‘ESRI Shapefile’
## Simple feature collection with 1 feature and 2 fields
## Geometry type: MULTIPOLYGON
## Dimension:     XY
## Bounding box:  xmin: -180 ymin: -21.0425 xmax: 180 ymax: -12.46172
## Geodetic CRS:  WGS 84
```

```
# Plot Fiji with zoomed-in boundaries
ggplot(data = fiji_shapefile) +
  geom_sf(fill = "lightgreen", color = "darkgreen") +
```

```
  coord_sf(
    xlim = c(176, 180),
    ylim = c(-20, -16)
  ) +
  labs(
    title = "Map of Fiji (Zoomed)",
    x = "Longitude",
    y = "Latitude"
  ) +
  theme_minimal()
```



Key facts about the Island State.

A formatted table displaying key facts about Fiji, emphasizing its biodiversity, parliamentary democracy, and historical independence.

```
# Create a table of key facts
key_facts <- tibble(
  Category = c("Government", "Economy", "Population", "Natural Environment", "History"),
  Details = c(
```

```
    "Parliamentary Democracy",
    "Tourism, Agriculture, and Fisheries",
    "Approximately 889,950 people",
    "Rich biodiversity with coral reefs and tropical forests",
    "Gained independence from the UK on October 10, 1970"
  )
)

# Display the table with kableExtra for formatting
key_facts_table <- kable(key_facts, col.names = c("Category", "Details")) %>%
  kable_styling(bootstrap_options = c("striped", "hover"), full_width = FALSE)

key_facts_table
```

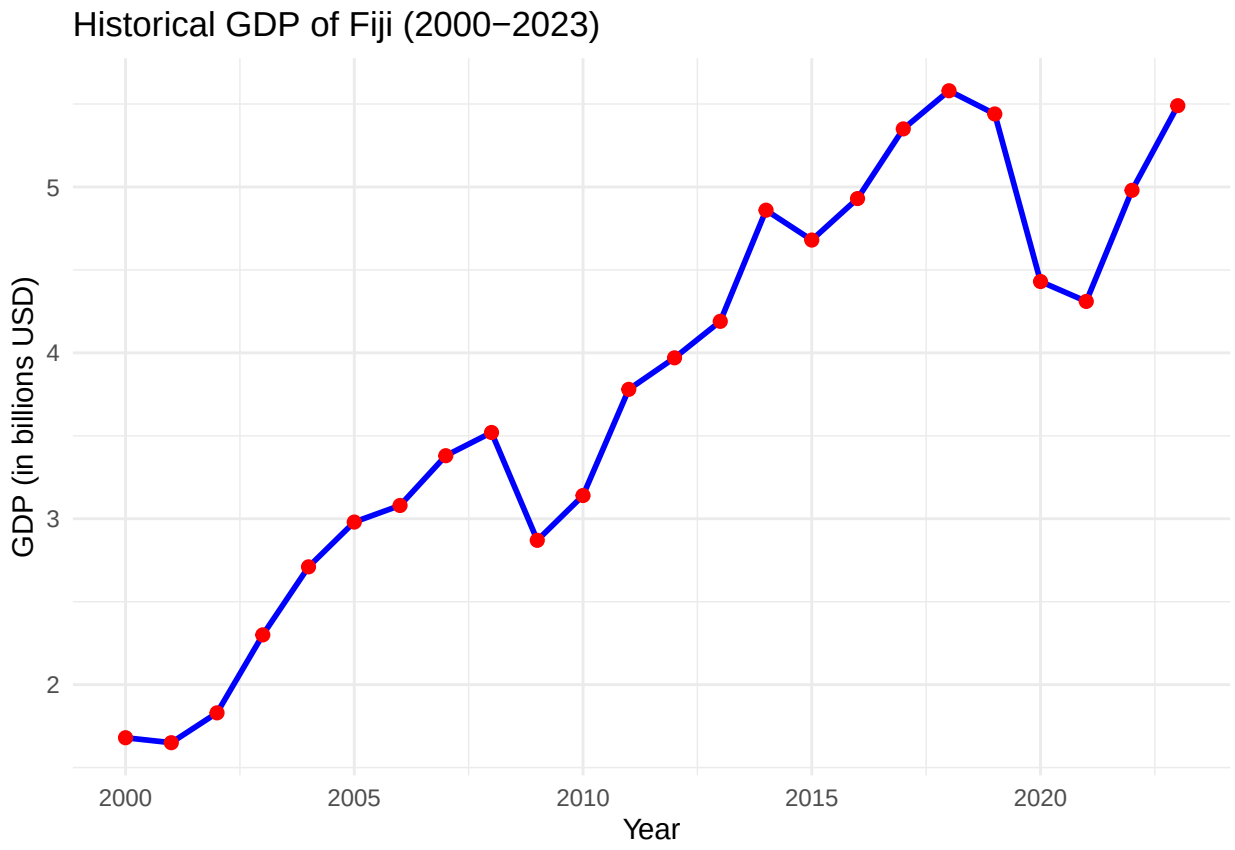
Category	Details
Government	Parliamentary Democracy
Economy	Tourism, Agriculture, and Fisheries
Population	Approximately 889,950 people
Natural Environment	Rich biodiversity with coral reefs and tropical forests
History	Gained independence from the UK on October 10, 1970

A projection of GDP.

A line chart showing historical GDP trends in blue and projected GDP trends in green (dashed line). In addtion, a clear visualization of Fiji's economic growth and anticipated trends based on linear regression.

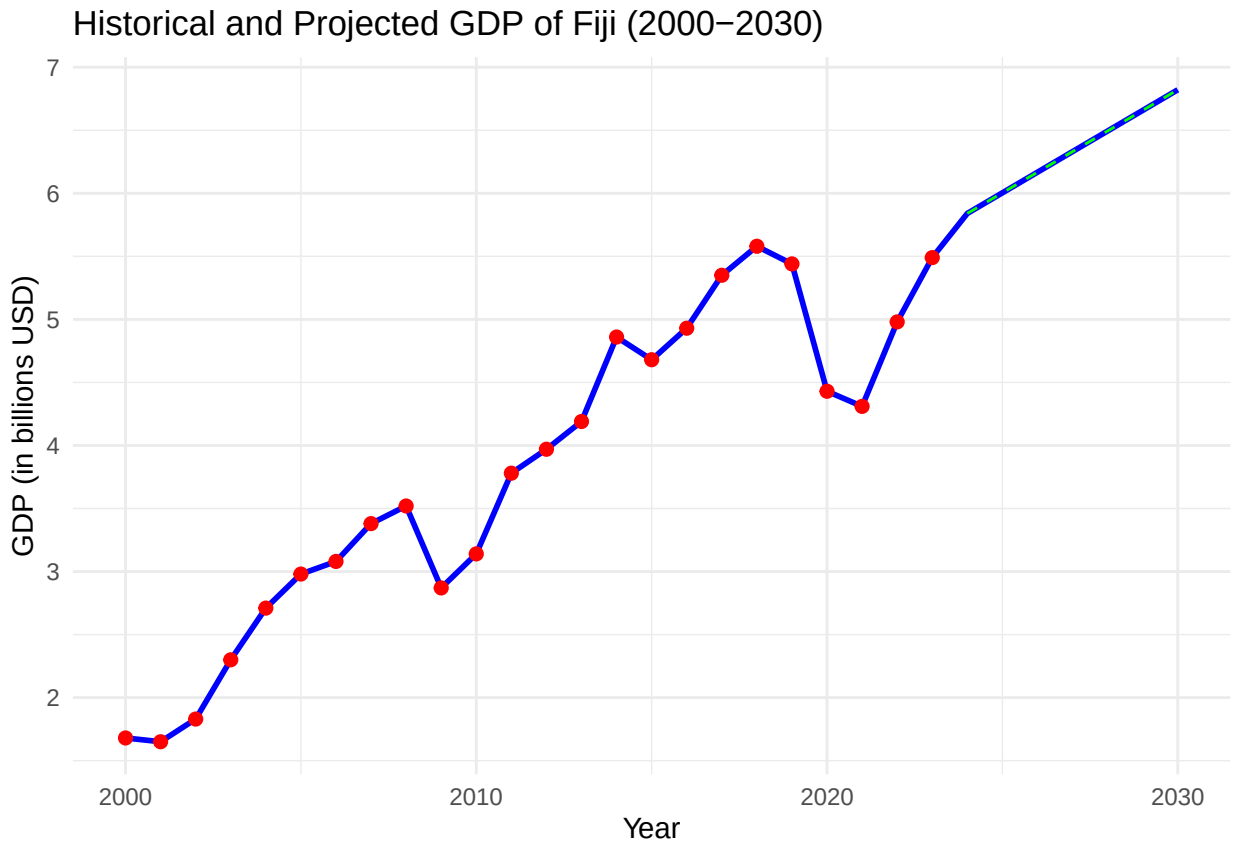
```
# Historical GDP data for Fiji (in billions USD)
# We use GDP data for Fiji from 2000 to 2023, sourced from Macrotrends
gdp_data <- data.frame(
  year = 2000:2023,
  gdp = c(1.68, 1.65, 1.83, 2.30, 2.71, 2.98, 3.08, 3.38, 3.52, 2.87,
          3.14, 3.78, 3.97, 4.19, 4.86, 4.68, 4.93, 5.35, 5.58, 5.44,
          4.43, 4.31, 4.98, 5.49)  # GDP in billions USD
)

# Plot historical GDP data
ggplot(gdp_data, aes(x = year, y = gdp)) +
  geom_line(color = "blue", size = 1) +
  geom_point(color = "red", size = 2) +
  labs(
    title = "Historical GDP of Fiji (2000-2023)",
    x = "Year",
    y = "GDP (in billions USD)"
  ) +
  theme_minimal()
```

```
## Warning: Using ‘size‘ aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use ‘linewidth‘ instead.
## This warning is displayed once every 8 hours.
## Call ‘lifecycle::last_lifecycle_warnings()‘ to see where this warning was
## generated.
```




```r
# Fit a linear model
gdp_model <- lm(gdp ~ year, data = gdp_data)

# Create future years for projection
future_years <- data.frame(year = 2024:2030)

# Predict GDP for future years
future_gdp <- predict(gdp_model, newdata = future_years)

# Combine historical and projected data
gdp_projection <- rbind(
  gdp_data,
  data.frame(year = future_years$year, gdp = future_gdp)
)

# Plot historical and projected GDP
ggplot(gdp_projection, aes(x = year, y = gdp)) +
  geom_line(color = "blue", size = 1) +
  geom_point(data = gdp_data, aes(x = year, y = gdp), color = "red", size = 2) +
  geom_line(data = future_years, aes(x = year, y = future_gdp), linetype = "dashed", color = "green") +
```

```
  labs(
    title = "Historical and Projected GDP of Fiji (2000-2030)",
    x = "Year",
    y = "GDP (in billions USD)"
  ) +
  theme_minimal()
```

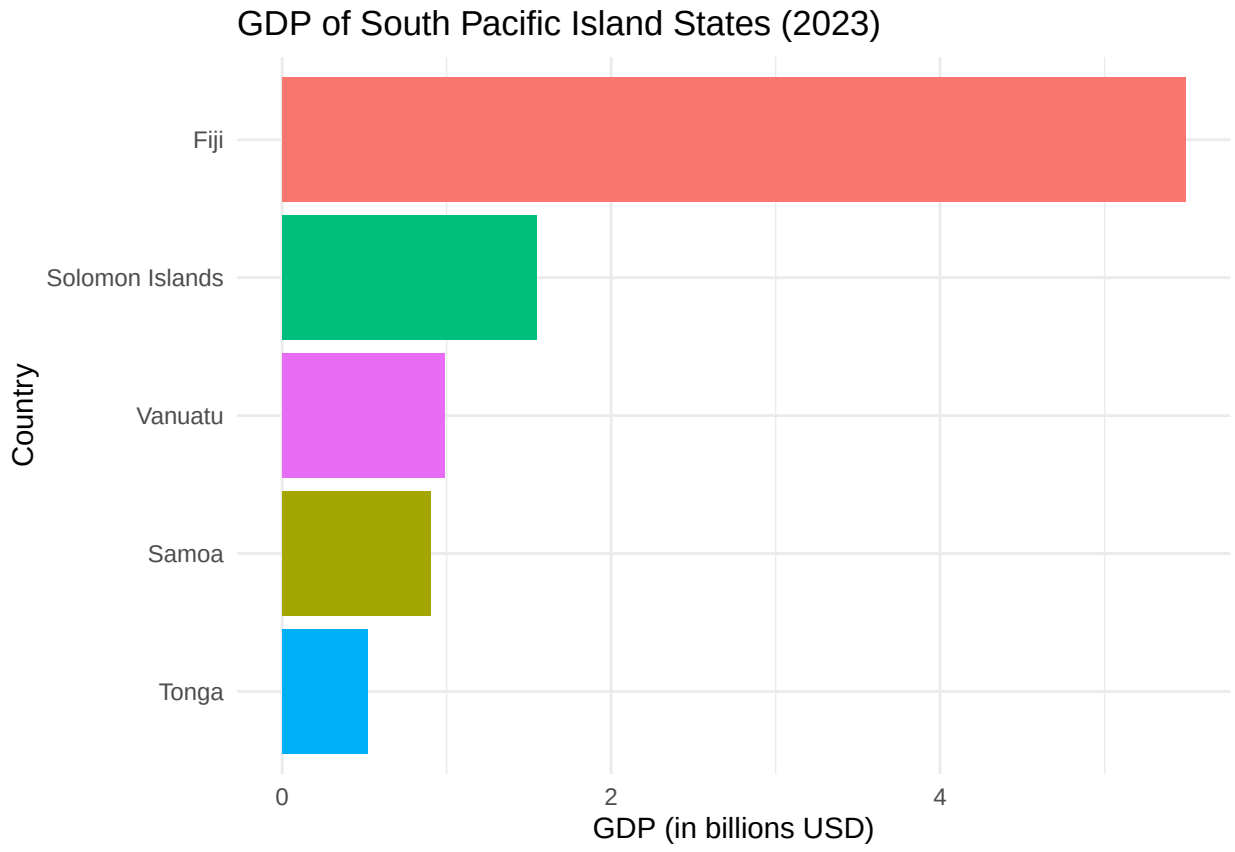


Comparison of the Island State relative to other Island States in the same region.

1) Comparison: A horizontal bar chart showing Fiji's relatively high GDP compared to neighboring states. 2) Population vs. Land Area: A scatter plot demonstrating the relationship between population and land area, with Fiji labeled prominently. 3) Tourist Arrivals: A bar chart highlighting Fiji as a leading tourist destination in the region.

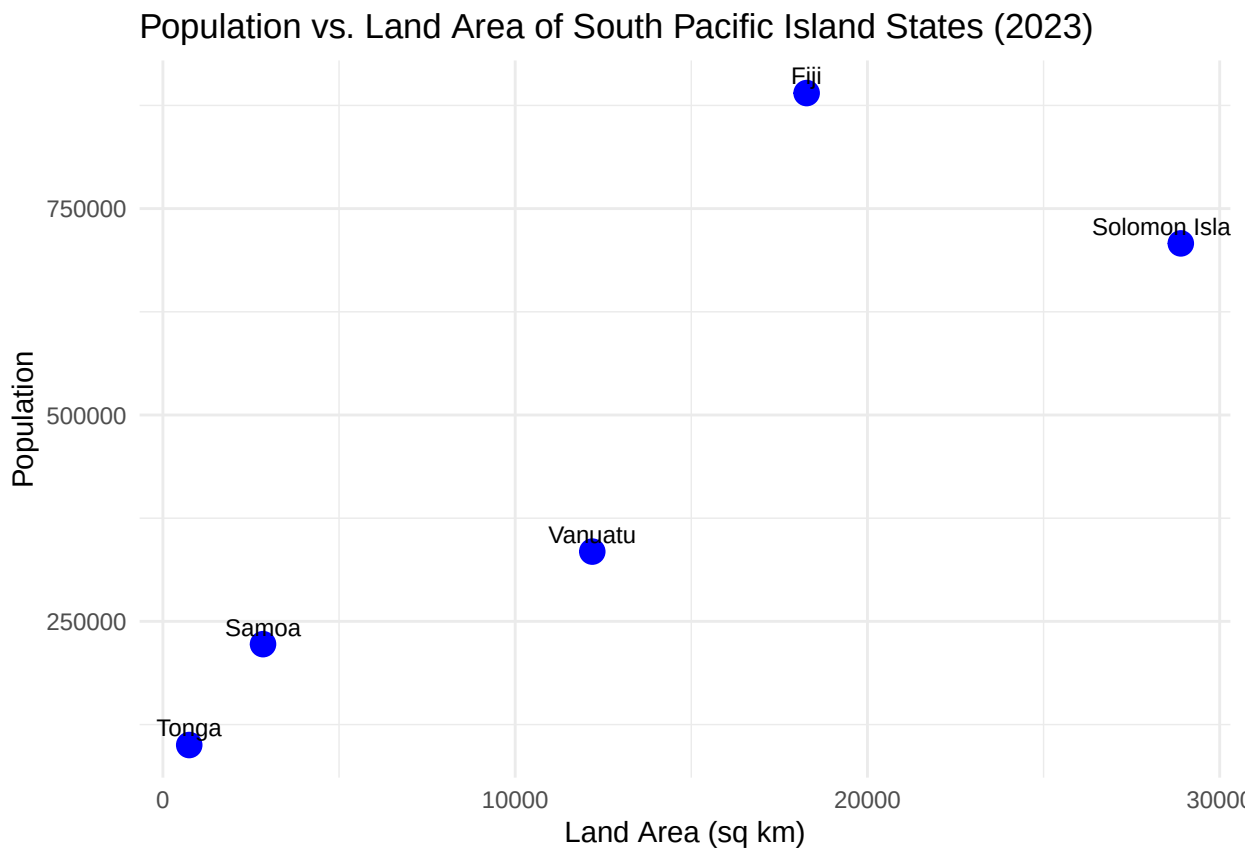
```
# We included Fiji, Vanuatu, Tonga, Samoa, and Solomon Islands in our comparison
# Comparison data for South Pacific island states
```

```r
island_states <- tibble(
  country = c("Fiji", "Vanuatu", "Tonga", "Samoa", "Solomon Islands"),
  gdp = c(5.49, 0.99, 0.52, 0.90, 1.55),              # GDP in billions USD (2023, Macrotrends)
  population = c(889950, 334506, 100209, 222382, 707851), # Population (2023, World Bank)
  land_area = c(18274, 12189, 747, 2842, 28896),          # Land area in square km
  tourists = c(800000, 300000, 90000, 150000, 30000)      # Annual tourist arrivals (approx.)
)

# Plot GDP comparison
ggplot(island_states, aes(x = reorder(country, gdp), y = gdp, fill = country)) +
  geom_col(show.legend = FALSE) +
  coord_flip() +
  labs(
    title = "GDP of South Pacific Island States (2023)",
    x = "Country",
    y = "GDP (in billions USD)"
  ) +
  theme_minimal()
```

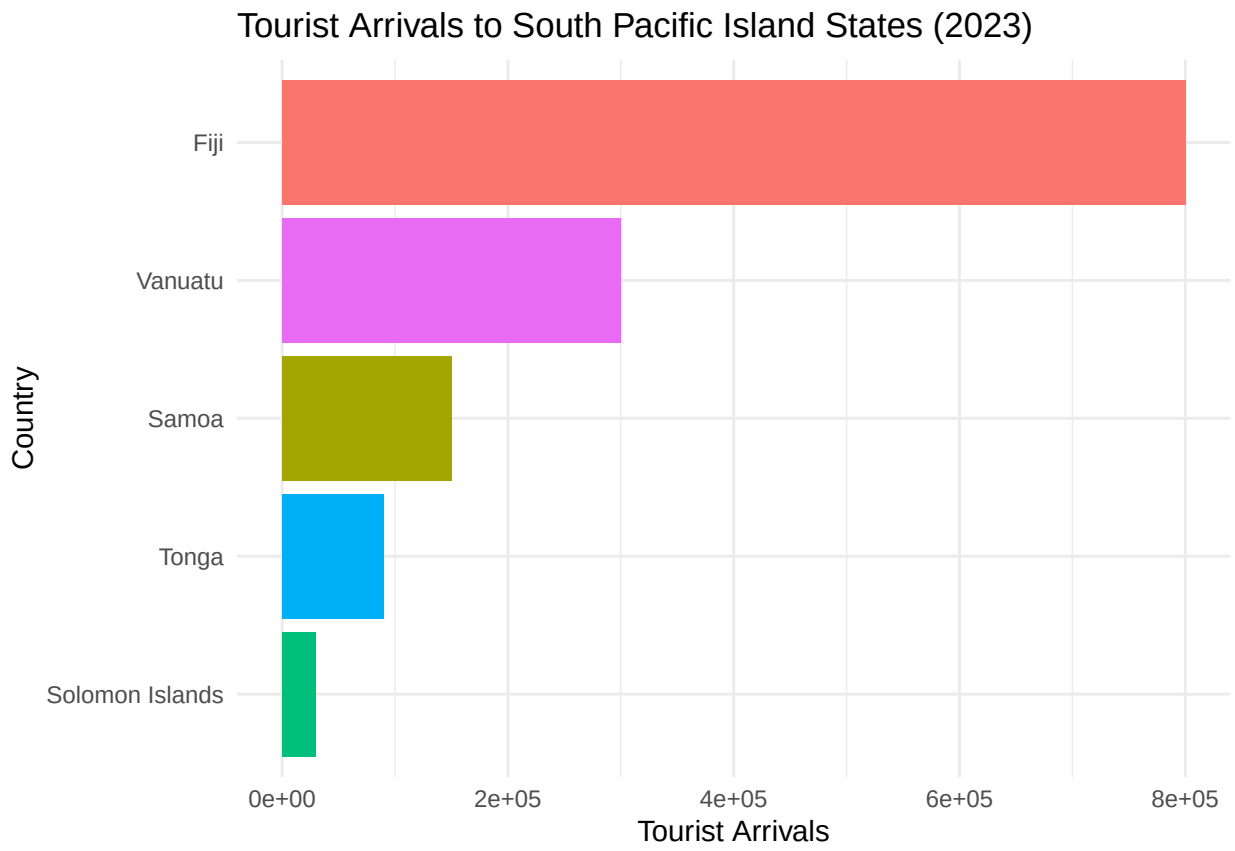



```r
# Scatter plot of population vs. land area
ggplot(island_states, aes(x = land_area, y = population, label = country)) +
  geom_point(size = 4, color = "blue") +
  geom_text(vjust = -0.5, hjust = 0.5, size = 3) +
  labs(
    title = "Population vs. Land Area of South Pacific Island States (2023)",
```

```
    x = "Land Area (sq km)",
    y = "Population"
  ) +
  theme_minimal()
```




```
# Plot tourist arrivals
ggplot(island_states, aes(x = reorder(country, tourists), y = tourists, fill = country)) +
  geom_col(show.legend = FALSE) +
  coord_flip() +
  labs(
    title = "Tourist Arrivals to South Pacific Island States (2023)",
    x = "Country",
    y = "Tourist Arrivals"
  ) +
  theme_minimal()
```




```
# Create a summary table
kable(island_states, col.names = c("Country", "GDP (Billion USD)", "Population", "Land Area (sq km)", "
  kable_styling(bootstrap_options = c("striped", "hover"), full_width = FALSE)
```

Country	GDP (Billion USD)	Population	Land Area (sq km)	Tourist Arrivals
Fiji	5.49	889950	18274	800000
Vanuatu	0.99	334506	12189	300000
Tonga	0.52	100209	747	90000
Samoa	0.90	222382	2842	150000
Solomon Islands	1.55	707851	28896	30000

SWOT analysis of the Island State.

A table outlines Fiji's Strengths, Weaknesses, Opportunities, and Threats (SWOT).

```
# Create a SWOT table
swot <- data.frame(
  Category = c("Strengths", "Weaknesses", "Opportunities", "Threats"),
  Details = c(
```

```
    # Strengths
    "1. Thriving tourism industry.\n2. Rich natural biodiversity, including coral reefs.\n3. Strategic l

    # Weaknesses
    "1. Vulnerable to natural disasters (cyclones).\n2. High reliance on tourism and agriculture.\n3. Li

    # Opportunities
    "1. Growth in eco-tourism and adventure tourism.\n2. Renewable energy potential (solar, wind, and hy

    # Threats
    "1. Climate change and rising sea levels.\n2. Increasing frequency of extreme weather events.\n3. Co
  )
)

# Display the SWOT analysis as a table
kable(swot, col.names = c("Category", "Details")) %>%
  kable_styling(bootstrap_options = c("striped", "hover"), full_width = FALSE)
```

Category	Details
Strengths	1. Thriving tourism industry. 2. Rich natural biodiversity, including coral reefs. 3. Strategic location in t
Weaknesses	1. Vulnerable to natural disasters (cyclones). 2. High reliance on tourism and agriculture. 3. Limited indu
Opportunities	1. Growth in eco-tourism and adventure tourism. 2. Renewable energy potential (solar, wind, and hydrop
Threats	1. Climate change and rising sea levels. 2. Increasing frequency of extreme weather events. 3. Competitio