

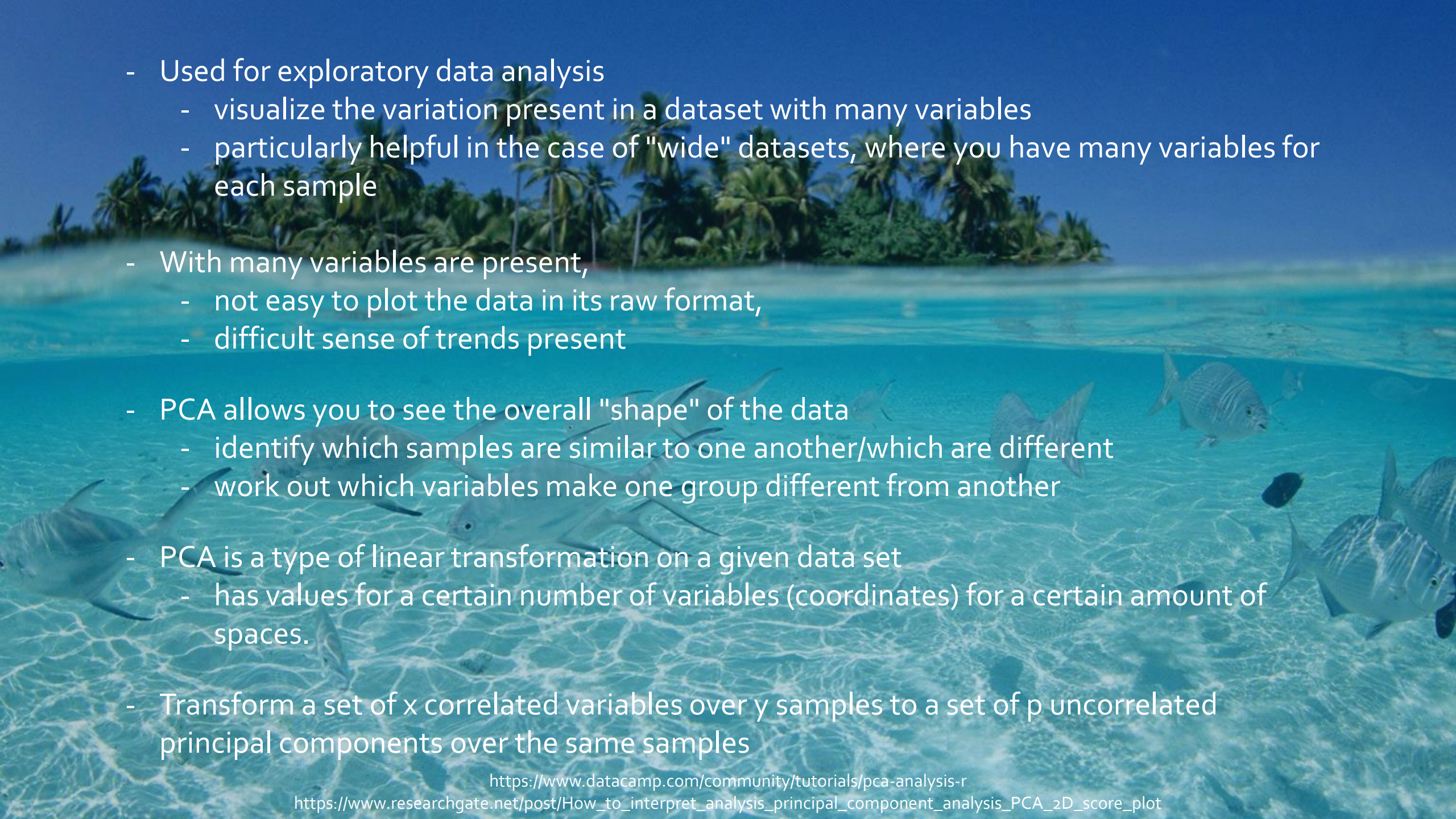
An underwater scene with several large, silver fish swimming in clear, turquoise water. In the background, a tropical island with palm trees is visible above the water's surface. The text "PCA Analysis in R" and "SIO R-users" is overlaid on the image.

PCA Analysis in R

SIO R-users

PCA = Principal Component Analysis

- introduction to PCA: principal components
 - how they relate to eigenvalues and eigenvectors
- Try a PCA using mtcars
- Visualization with the ggbiplot package
- Applying PCA to my own project

- 
- Used for exploratory data analysis
 - visualize the variation present in a dataset with many variables
 - particularly helpful in the case of "wide" datasets, where you have many variables for each sample
 - With many variables are present,
 - not easy to plot the data in its raw format,
 - difficult sense of trends present
 - PCA allows you to see the overall "shape" of the data
 - identify which samples are similar to one another/which are different
 - work out which variables make one group different from another
 - PCA is a type of linear transformation on a given data set
 - has values for a certain number of variables (coordinates) for a certain amount of spaces.
 - Transform a set of x correlated variables over y samples to a set of p uncorrelated principal components over the same samples

Eigenvalues and Eigenvectors

- Eigenvectors, and eigenvalues come in pairs
 - every eigenvector has a corresponding eigenvalue
- For example, if there are 2 variables, the data set is two-dimensional
 - that means that there are two eigenvectors and eigenvalues
 - similarly, you'd find three pairs in a three-dimensional data set.
- Reframe a dataset in terms of eigenvectors and eigenvalues w/o changing the underlying information

A split-level photograph showing a clear blue sky above the water and a vibrant underwater scene below. The water is crystal clear, revealing a sandy bottom with intricate patterns of light and shadow. Several large, silver fish with dark stripes are swimming in the foreground. In the background, a lush tropical island with numerous palm trees is visible on the horizon. The text "INTO THE R CODE!" is overlaid in white, bold, sans-serif capital letters across the center of the image.

INTO THE R CODE!

