In [1]:

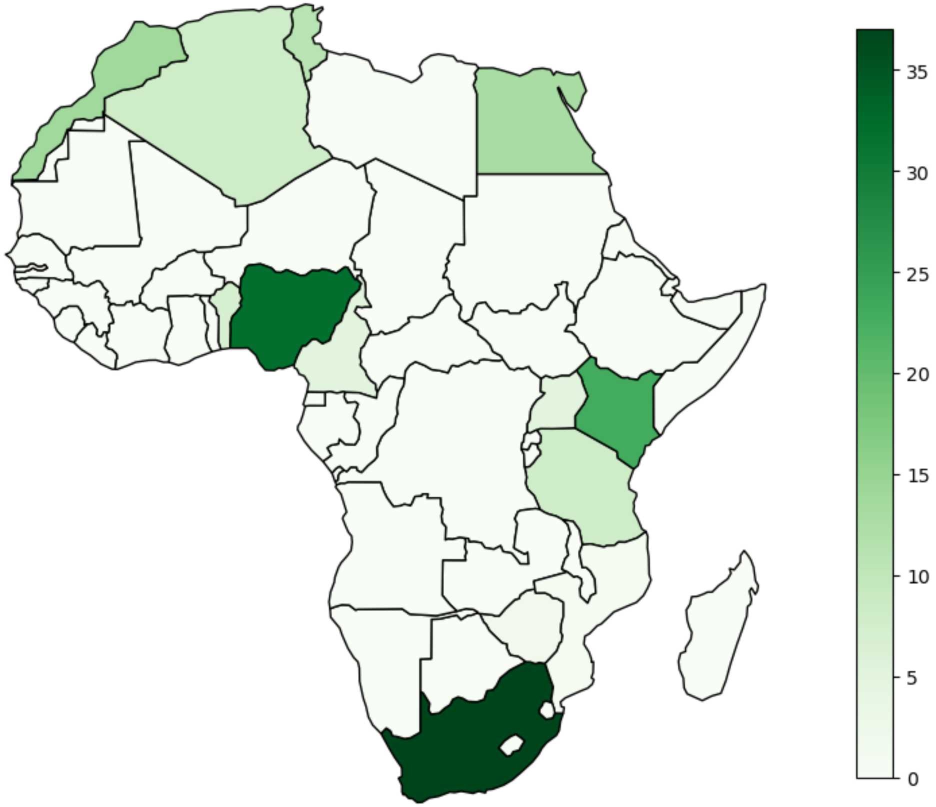
```
import pandas as pd
import geopandas as gpd
import geoplot as gplt
import geoplot.crs as gcrs
import matplotlib.pyplot as plt
import mapclassify as mc
import seaborn as sns
from matplotlib.colors import LinearSegmentedColormap
from shapely.geometry import MultiPoint, Point
```

Alternative_Model_Africa

In [3]:

```
world = gpd.read_file(gpd.datasets.get_path('naturalearth_lowres'))
Africa = (world[world['continent'] ==  'Africa'])
gdf1 = gpd.GeoDataFrame(pd.read_csv('GPS_1.csv', encoding='latin-1'), geometry=gpd.points_from_xy(pd.read_csv('GPS_1.csv', encoding='latin-1').Long, pd.read_csv('GPS_1.csv', encoding='la
Africa['Number of Articles'] = ['8','0','0','0','23','0','0','37','0','2','0','0','0','0','0','7','0','32','5','0','0','0','0','0','0','0','0','0','0','0','0','0','0','1','0','0','0','0'
Africa['Number of Articles']=Africa['Number of Articles'].apply(int)
ax = Africa.plot(column='Number of Articles', cmap='Greens',
            edgecolor='k',figsize=(14, 8), legend=True,legend_kwds={'shrink': 0.6})
fig = plt.gcf()
ax.set_axis_off();
fig.set_size_inches(10, 12)
plt.savefig('Fig 1C.JPG', dpi=300)
```

```
C:\Users\user\.conda\envs\stat\lib\site-packages\geopandas\geodataframe.py:1472: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/
user_guide/indexing.html#returning-a-view-versus-a-copy)
  super().__setitem__(key, value)
```



In [4]:

```
df1 = pd.read_csv('DROSO.csv', encoding='latin-1')
Count1 = pd.crosstab(index=df1['Country'], columns='counts')
Count1['percent'] = (Count1['counts'] / Count1['counts'].sum()) * 100
Count1
```

Out[4]:

```
       col_0  counts    percent
     Country
     Algeria       8   4.761905
       Benin       7   4.166667
    Cameroon       5   2.976190
       Egypt      13   7.738095
       Kenya      23  13.690476
   Mauritius       2   1.190476
     Morocco      14   8.333333
  Mozambique       1   0.595238
     Nigeria      32  19.047619
South Africa      37  22.023810
    Tanzania       8   4.761905
     Tunisia      11   6.547619
      Uganda       5   2.976190
    Zimbabwe       2   1.190476
```

In [6]:

```
df1 = pd.read_csv('DROSO.csv', encoding='latin-1')
Countf = pd.crosstab(index=df1['Model'], columns='counts')
Countf['percent'] = (Countf['counts'] / Countf['counts'].sum()) * 100
Countf
```

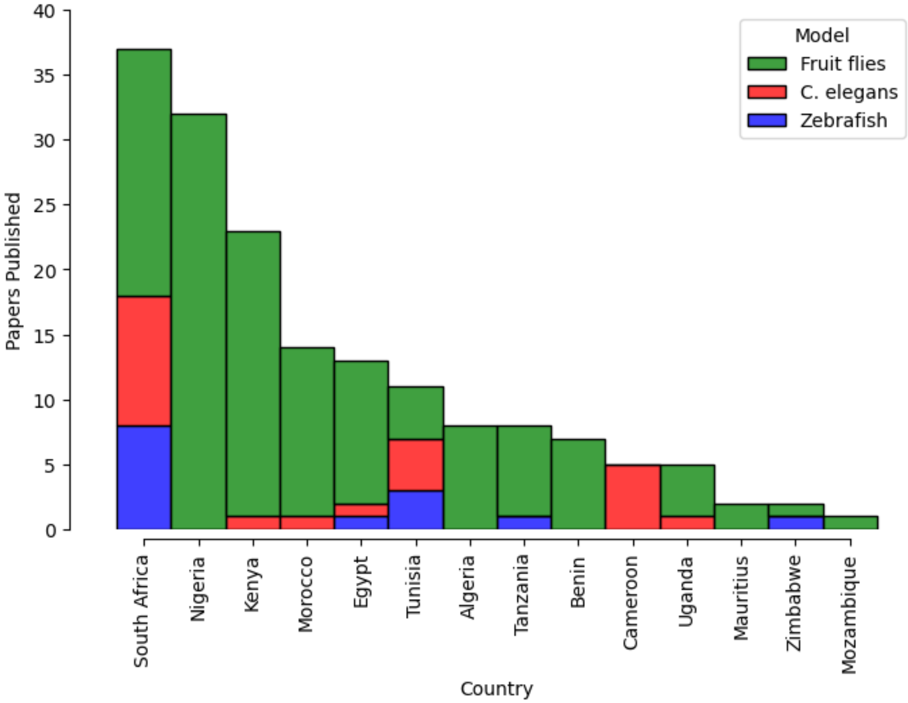
Out[6]:

```
      col_0  counts    percent
      Model
 C. elegans      23  13.690476
Fruit flies     131  77.976190
  Zebrafish      14   8.333333
```

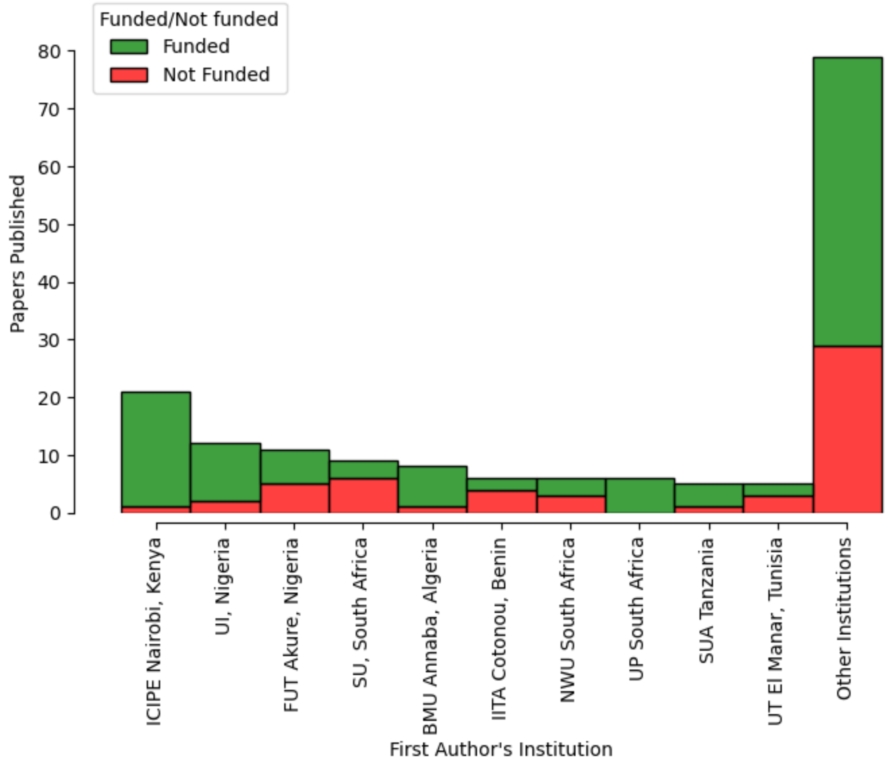
In [ ]:

```
[South","Africa","Nigeria","Kenya","Morocco","Egypt","Tunisia","Algeria","Tanzania","Benin","Cameroon","Uganda","Mauritius","Zimbabwe","Mozambique]
```

```
In [16]: df1['Country'] = pd.Categorical(df1['Country'],["South Africa","Nigeria","Kenya","Morocco","Egypt","Tunisia","Algeria","Tanzania","Benin","Cameroon","Uganda","Mauritius","Zimbabwe","Moza
         plt.ylim(0, 40)
         sns.histplot(x="Country",
                      hue="Model", palette=["g","r","b"], multiple="stack",
                     data=df1),
         sns.despine(offset=5, trim=True)
         plt.xticks(rotation=90)
         plt.ylabel('Papers Published')
         fig = plt.gcf()
         fig.set_size_inches(8, 5)
         plt.savefig('Fig 2b.JPG', bbox_inches = 'tight', dpi=300)
```



```
In [17]: df1["First Author's Institution"] = pd.Categorical(df1["First Author's Institution"],["ICIPE Nairobi, Kenya",
         "UI, Nigeria",
         "FUT Akure, Nigeria",
         "SU, South Africa",
         "BMU Annaba, Algeria",
         "IITA Cotonou, Benin",
         "NWU South Africa",
         "UP South Africa",
         "SUA Tanzania",
         "UT El Manar, Tunisia",
         "Other Institutions"])
         df1['Funded/Not funded'] = df1['Funded/Not funded'].replace({1: 'Funded', 0: 'Not Funded'})
         df1['Funded/Not funded']= df1['Funded/Not funded'].apply(str)
         sns.histplot(x="First Author's Institution",
                      hue="Funded/Not funded", palette=["g","r"], multiple="stack",
                     data=df1),
         sns.despine(fig=None, ax=None, top=True, right=True, left=False, bottom=False, offset=5, trim=True)
         plt.xticks(rotation=90)
         plt.ylabel('Papers Published')
         plt.ylim(0, 90)
         fig = plt.gcf()
         fig.set_size_inches(8, 5)
         plt.savefig('Fig 1D.JPG', bbox_inches = 'tight', dpi=300)
```



```
In [ ]: pd.crosstab(foo, bar)
```

```
In [ ]: "ICIPE Nairobi, Kenya",
        "UI, Nigeria",
        "FUT Akure, Nigeria",
        "SU, South Africa",
        "BMU Annaba, Algeria",
        "IITA Cotonou, Benin",
        "NWU South Africa",
        "UP South Africa",
        "SUA Tanzania",
        "UT El Manar, Tunisia",
        "Others"
```

```
In [18]: CountA = pd.crosstab(index=df1["First Author's Institution"], columns='counts')
         CountA['percent'] = (CountA['counts'] / CountA['counts'].sum()) * 100
         CountA
```

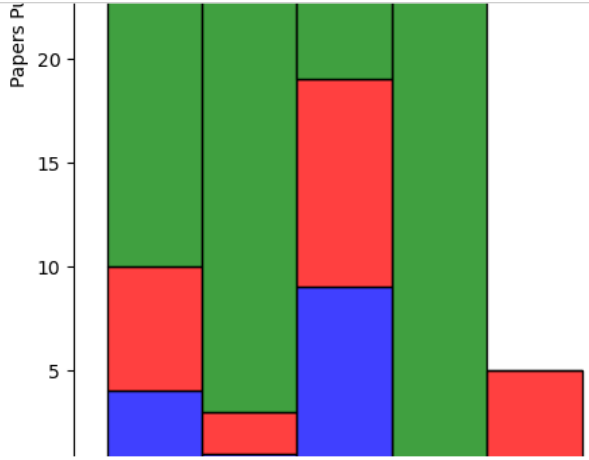
```
Out[18]:
                                col_0  counts    percent
         First Author's Institution
                 ICIPE Nairobi, Kenya      21  12.500000
                          UI, Nigeria      12   7.142857
                   FUT Akure, Nigeria      11   6.547619
                     SU, South Africa       9   5.357143
                  BMU Annaba, Algeria       8   4.761905
                  IITA Cotonou, Benin       6   3.571429
                     NWU South Africa       6   3.571429
                      UP South Africa       6   3.571429
                         SUA Tanzania       5   2.976190
                 UT El Manar, Tunisia       5   2.976190
                   Other Institutions      79  47.023810
```

```
In [19]: CountAa = pd.crosstab(index=df1["Region"], columns='counts')
         CountAa['percent'] = (CountAa['counts'] / CountAa['counts'].sum()) * 100
         CountAa
```

```
Out[19]:
                    col_0  counts    percent
                   Region
             North Africa      46  27.380952
              East Africa      39  23.214286
         Southaern Africa      39  23.214286
              West Africa      39  23.214286
           Central Africa       5   2.976190
```

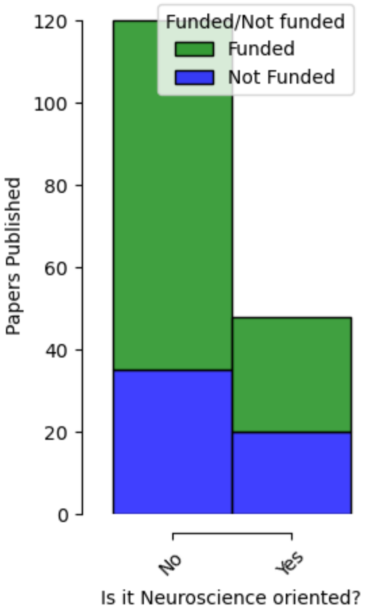
In [20]:

```
df1["Region"] = pd.Categorical(df1["Region"],["North Africa",
"East Africa",
"Southaern Africa",
"West Africa",
"Central Africa"])
sns.histplot(x="Region",
             hue="Model", palette=["g","r","b"], multiple="stack",
            data=df1),
sns.despine(offset=5, trim=False)
plt.xticks(rotation=45)
fig = plt.gcf()
plt.ylabel('Papers Published')
fig.set_size_inches(5, 9)
plt.savefig('Fig 2A.JPG', bbox_inches = 'tight', dpi=300)
plt.ylim(0, 45)
```



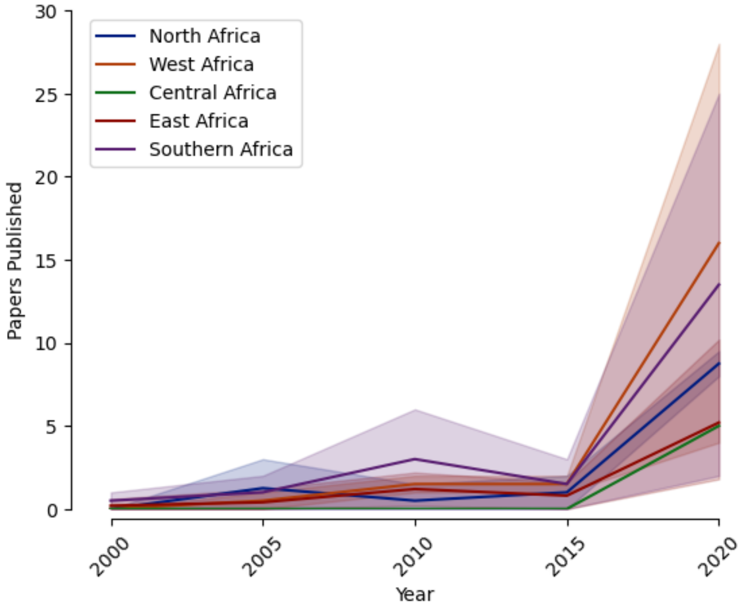
In [21]:

```
df1['Is it Neuroscience oriented?'] = df1['Is it Neuroscience oriented?'].replace({1: 'Yes', 0: 'No'})
df1['Is it Neuroscience oriented?']= df1['Is it Neuroscience oriented?'].apply(str)
sns.histplot(x="Is it Neuroscience oriented?",
             hue="Funded/Not funded", palette=["g","b"], multiple="stack",
            data=df1),
sns.despine(offset=10, trim=True)
plt.xticks(rotation=45)
fig = plt.gcf()
plt.ylabel('Papers Published')
fig.set_size_inches(2.5, 5)
plt.savefig('Neuro_Fund.JPG', bbox_inches = 'tight', dpi=300)
```



In [23]:

```
df2 = pd.read_csv('T_S_N.csv')
df2['Year']=df2['Year'].apply(str)
df2_2 = pd.read_csv('TS_2.csv')
df2_2['Year']=df2_2['Year'].apply(str)
plt.ylim(0, 30)
sns.lineplot(x='Year', y='Number', hue='Region',
palette="dark",markers=True,dashes=False, data=df2)
sns.despine(offset=5, trim=True)
plt.xticks(rotation=45)
plt.ylabel('Papers Published')
plt.legend(loc = 'upper left')
fig.set_size_inches(8, 5)
plt.savefig('Fig 1b.JPG', dpi=300)
```



In [ ]:

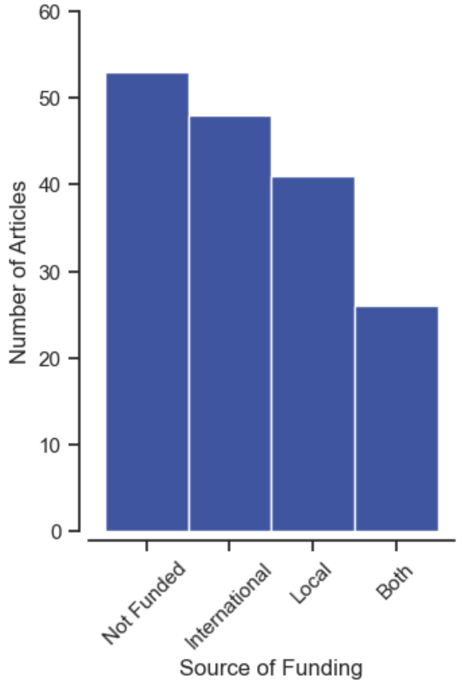
```
df1['Funded/Not funded'] = df1['Funded/Not funded'].replace({1: 'Funded', 0: 'Not Funded'})
df1['Funded/Not funded']= df1['Funded/Not funded'].apply(str)

sns.set_theme(style="ticks", palette="dark")

sns.histplot(x="Funded/Not funded",
            data=df1)
sns.despine(offset=10, trim=False)
plt.ylim(0, 120)
plt.xlabel('Funding Status')
plt.ylabel('Number of Articles')
plt.xticks(rotation=25)
fig = plt.gcf()
fig.set_size_inches(2, 5.2)
fig.savefig('NEWFunding_Status.JPG',  bbox_inches = 'tight', dpi=300)
```

In [26]:
```
fund = pd.crosstab(index=df1['Funded/Not funded'], columns='counts')
fund['percent'] = (fund['counts'] / fund['counts'].sum()) * 100
fund
```

Out[26]:
```
            col_0  counts    percent
Funded/Not funded
           Funded     113  67.261905
       Not Funded      55  32.738095
```

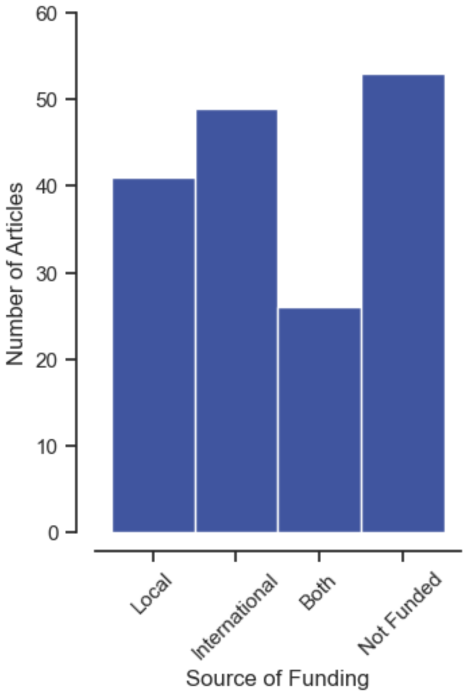
In [32]:

```
df1['Funding'] = df1['Funding'].replace({0: 'Not Funded', 1: 'Local', 2: 'International', 3: 'Both'})
df1['Funding']=df1['Funding'].apply(str)
df1["Funding"] = pd.Categorical(df1["Funding"],["Not Funded",
"International",
"Local",
"Both",
])
import seaborn as sns
sns.set_theme(style="ticks", palette="dark")
sns.histplot(x="Funding",
            data=df1)
sns.despine(offset=5, trim=False)
plt.xticks(rotation=45)
plt.ylabel('Number of Articles')
plt.ylim(0, 60)
fig = plt.gcf()
plt.xlabel('Source of Funding')
fig.set_size_inches(3.5, 5)
plt.savefig('Fig 3A.JPG', bbox_inches = 'tight', dpi=300)
```



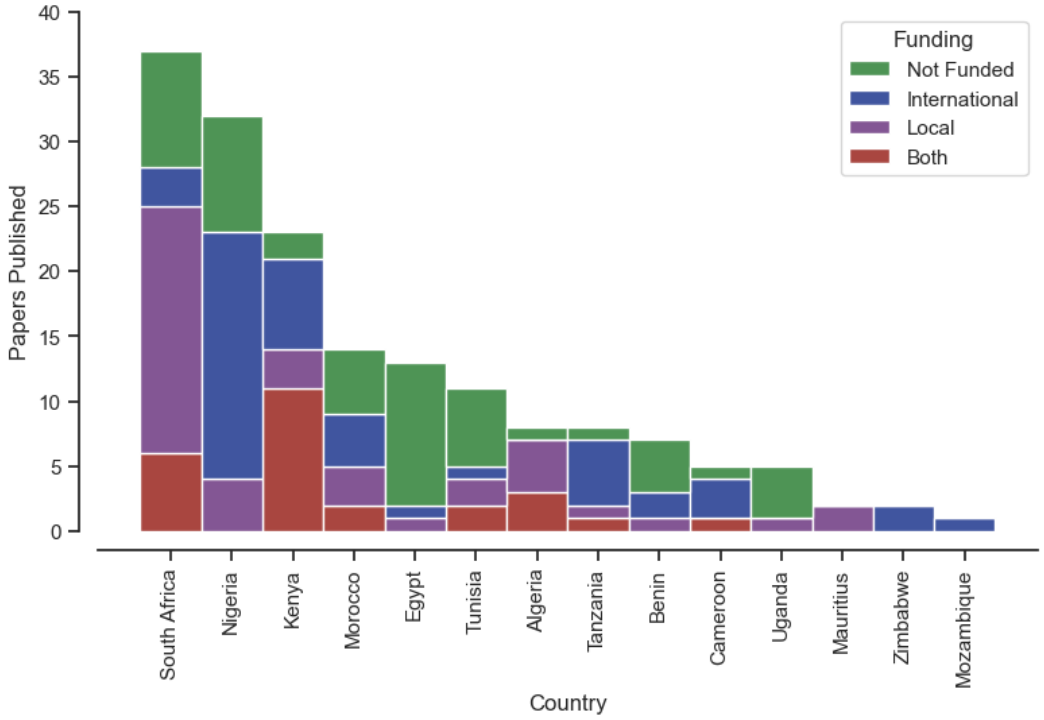
In [31]:

```
df5 = pd.read_csv('DROS.csv', encoding='latin-1')
df5['Fund'] = df5['Fund'].replace({0: 'Not Funded', 1: 'Local', 2: 'International', 3: 'Both'})
df5['Fund']=df5['Fund'].apply(str)
import seaborn as sns
sns.set_theme(style="ticks", palette="dark")
sns.histplot(x="Fund",
            data=df5)
sns.set_theme(style="ticks", palette="dark")
sns.despine(offset=10, trim=False)
fig = plt.gcf()
fig.set_size_inches(3.5, 5)
plt.xticks(rotation=45)
plt.ylabel('Number of Articles')
plt.ylim(0, 60)
fig = plt.gcf()
plt.xlabel('Source of Funding')
fig.set_size_inches(3.5, 5)
plt.savefig('NEWHist_papers_published_Funding.png', bbox_inches = 'tight', dpi=300)
```



In [33]:

```
sns.histplot(x="Country",
             hue="Funding", palette=["g","b","m","r"], multiple="stack",
            data=df1),
sns.despine(offset=10, trim=False)
plt.xticks(rotation=90)
plt.ylabel('Papers Published')
plt.ylim(0, 40)
fig = plt.gcf()
fig.set_size_inches(9, 5)
plt.savefig('Fig 3B.JPG', bbox_inches = 'tight', dpi=300)
```



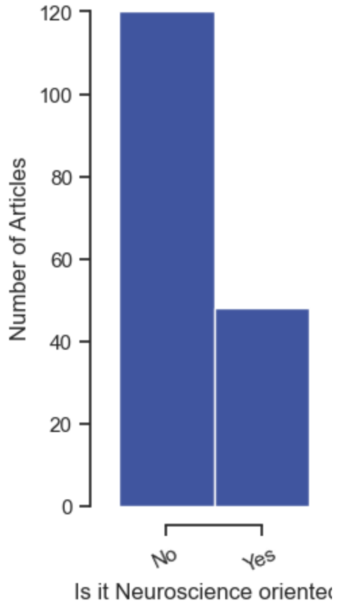
In [34]:

```
fund2 = pd.crosstab(index=df1['Funding'], columns='counts')
fund2['percent'] = (fund2['counts'] / fund2['counts'].sum()) * 100
fund2
```

Out[34]:

col_0	counts	percent
Funding		
Not Funded	53	31.547619
International	48	28.571429
Local	41	24.404762
Both	26	15.476190

In [35]:
```
df1['Is it Neuroscience oriented?'] = df1['Is it Neuroscience oriented?'].replace({1: 'Yes', 0: 'No'})
df1['Is it Neuroscience oriented?']= df1['Is it Neuroscience oriented?'].apply(str)

sns.set_theme(style="ticks", palette="dark")

sns.histplot(x="Is it Neuroscience oriented?",
            data=df1)
sns.despine(offset=10, trim=True)
plt.xlabel('Is it Neuroscience oriented?')
plt.ylabel('Number of Articles')
plt.xticks(rotation=25)
fig = plt.gcf()
fig.set_size_inches(2, 5)
fig.savefig('Fig 2c.JPG',  bbox_inches = 'tight', dpi=300)
```



In [36]:
```
Count3 = pd.crosstab(index=df1['Is it Neuroscience oriented?'], columns='counts')
Count3['percent'] = (Count3['counts'] / Count3['counts'].sum()) * 100
Count3
```

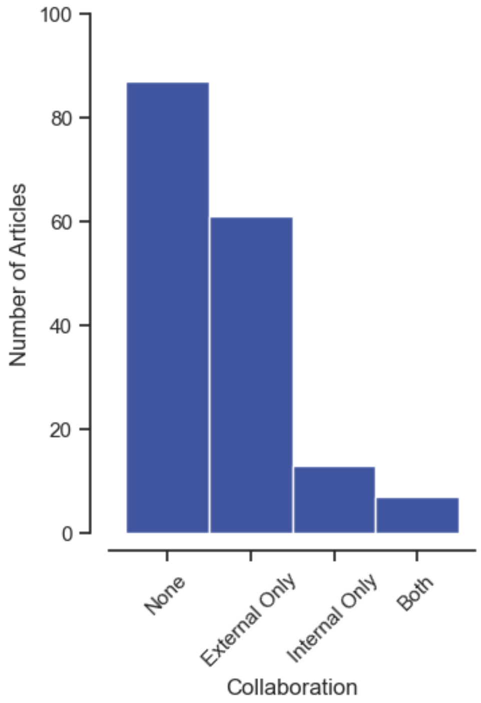
Out[36]:
```
                        col_0  counts    percent
Is it Neuroscience oriented?
                           No     120  71.428571
                          Yes      48  28.571429
```

In [ ]:

```
Both     7   4.166667
External Only   61  36.309524
Internal Only   13  7.738095
None
```

In [37]:

```
df1['IEC'] = df1['IEC'].replace({0: 'None', 1: 'External Only', 2: 'Internal Only', 3: 'Both'})
df1['IEC']=df1['IEC'].apply(str)
df1["IEC"] = pd.Categorical(df1["IEC"],["None",
"External Only",
"Internal Only",
"Both",
])
import seaborn as sns
sns.set_theme(style="ticks", palette="dark")
sns.histplot(x="IEC",
            data=df1)
sns.despine(offset=10, trim=False)
plt.xticks(rotation=45)
plt.ylabel('Number of Articles')
plt.ylim(0, 100)
fig = plt.gcf()
plt.xlabel('Collaboration')
fig.set_size_inches(3.5, 5)
plt.savefig('Fig 4a.JPG', bbox_inches = 'tight', dpi=300)
```

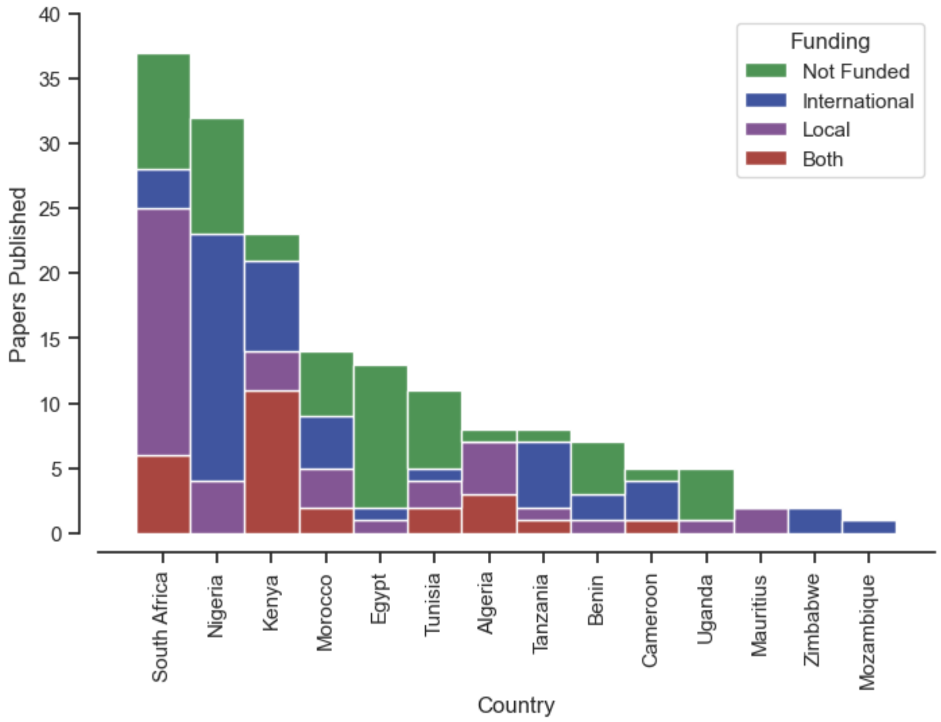


```
In [38]: Count4 = pd.crosstab(index=df1['IEC'], columns='counts')
         Count4['percent'] = (Count4['counts'] / Count4['counts'].sum()) * 100
         Count4
```

Out[38]:

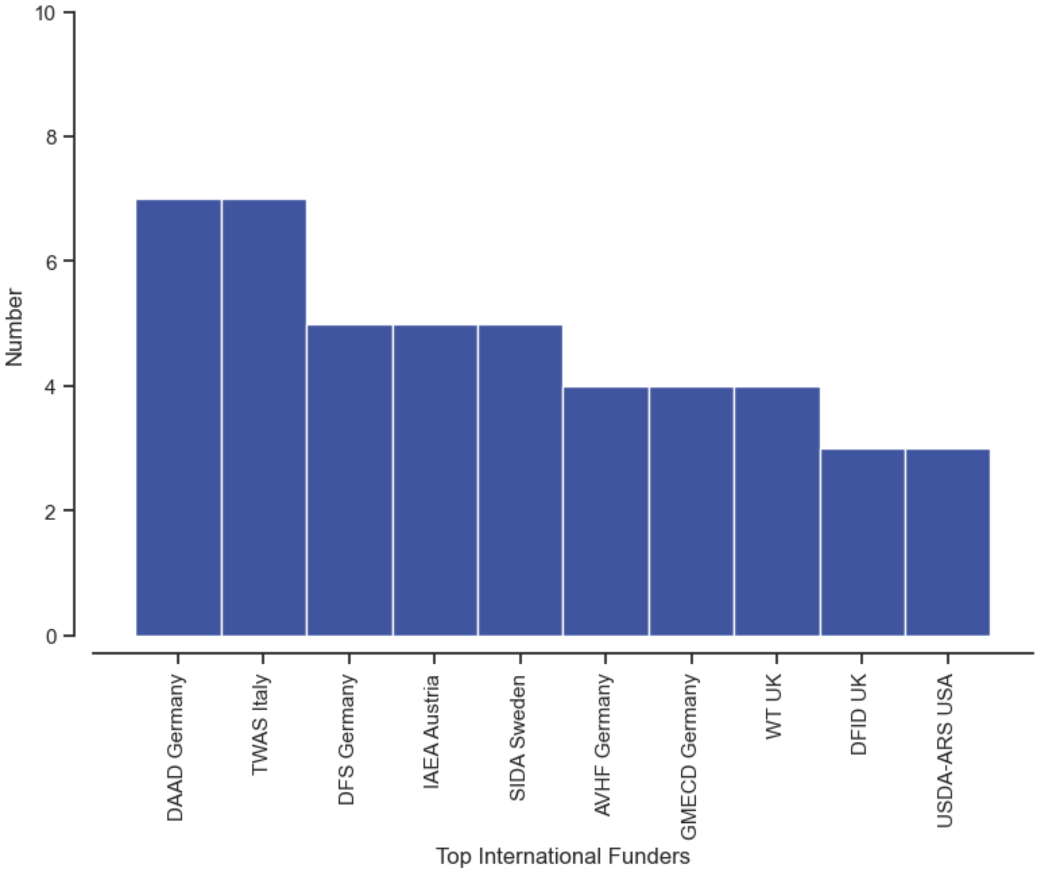
col_0	counts	percent
IEC		
None	87	51.785714
External Only	61	36.309524
Internal Only	13	7.738095
Both	7	4.166667

```
In [40]: sns.histplot(x="Country",
                      hue="Funding", palette=["g","b","m","r"], multiple="stack",
                     data=df1),
         sns.despine(offset=10, trim=False)
         plt.xticks(rotation=90)
         plt.ylabel('Papers Published')
         plt.ylim(0, 40)
         fig = plt.gcf()
         fig.set_size_inches(8, 5)
         plt.savefig('Fig 3B.JPG', bbox_inches = 'tight', dpi=300)
```



In [41]:

```
df3_1 = pd.read_csv('IF_1.csv',encoding='latin-1')
df3_1["Top International Funders"] = pd.Categorical(df3_1["Top International Funders"],["DAAD Germany",
"TWAS Italy",
"DFS Germany",
"IAEA Austria",
"SIDA Sweden",
"AVHF Germany",
"GMECD Germany",
"WT UK",
"DFID UK",
"USDA-ARS USA"
])
sns.set_theme(style="ticks", palette="dark")
sns.histplot(x="Top International Funders",
            data=df3_1)
sns.despine(offset=10, trim=False)
plt.xticks(rotation=90)
plt.ylim(0, 10)
plt.ylabel('Number')
fig = plt.gcf()
fig.set_size_inches(9, 6)
plt.savefig('Fig 3c.JPG', bbox_inches = 'tight', dpi=300)
```


10
8
6
4
2
0
Number
DAAD Germany
TWAS Italy
DFS Germany
IAEA Austria
SIDA Sweden
AVHF Germany
GMECD Germany
WT UK
DFID UK
USDA-ARS USA
Top International Funders

In [44]:
```
Count5 = pd.crosstab(index=df3_1['Top International Funders'], columns='counts')
Count5['percent'] = (Count5['counts'] / Count5['counts'].sum()) * 100
Count5
```

Out[44]:
```
                          col_0  counts    percent
Top International Funders
                   DAAD Germany       7  14.893617
                     TWAS Italy       7  14.893617
                    DFS Germany       5  10.638298
                   IAEA Austria       5  10.638298
                    SIDA Sweden       5  10.638298
                   AVHF Germany       4   8.510638
                  GMECD Germany       4   8.510638
                          WT UK       4   8.510638
                        DFID UK       3   6.382979
                   USDA-ARS USA       3   6.382979
```

In [39]:
```
Count5.to_csv('fund__.csv', index=True)
```

In [ ]:
```
"DAAD Germany",
"TWAS Italy",
"DFS Germany",
"IAEA Austria",
"SIDA Sweden",
"AVHF Germany",
"GMECD Germany",
"WT UK",
"DFID UK",
"USDA-ARS USA",
"BDC Belgium",
"CAARF UK",
"CAPES Brazil",
"FAPERGS Portugal",
"IDEEV France",
"IFAD Italy",
"MFA Finland",
"MWRB Belgium",
"PRANAROM IC Belgium"
```

In [46]:
```
Count6.to_csv('fundc__.csv', index=True)
```

In [46]:
```
df3_1.head()
```

Out[46]:

	International Funder_Full	International Funders	International Funder_COUNTRY	Top International Funders
0	Alexander von Humboldt Foundation	AVHF	Germany	AVHF Germany
1	Alexander von Humboldt Foundation	AVHF	Germany	AVHF Germany
2	Alexander von Humboldt Foundation	AVHF	Germany	AVHF Germany
3	Alexander von Humboldt Foundation	AVHF	Germany	AVHF Germany
4	Belgium development cooperation	BDC	Belgium	NaN

In [44]:
```
Count6 = pd.crosstab(index=df3['International Funder_COUNTRY'], columns='counts')
Count6['percent'] = (Count6['counts'] / Count6['counts'].sum()) * 100
Count6
```

Out[44]:

col_0	counts	percent
International Funder_COUNTRY		
Austria	5	7.692308
Belgium	6	9.230769
Brazil	2	3.076923
Finland	2	3.076923
France	2	3.076923
Germany	20	30.769231
Italy	9	13.846154
Portugal	2	3.076923
Sweden	5	7.692308
UK	9	13.846154
USA	3	4.615385

```
In [56]: df6 = pd.read_csv('INT_COLAB.csv',encoding='latin-1')
         gdf6 = gpd.GeoDataFrame(df6, geometry=gpd.points_from_xy(df6.Longitude1, df6.Latitude1))
         gdf6['geom2'] = [Point(x, y) for x, y in zip(df6.Longitude2, df6.Latitude2)]
         gdf6['multi'] = [MultiPoint([x, y]) for x, y in zip(gdf6.geometry, gdf6.geom2)]
         cleaned_gdf6 = gdf6.set_geometry('multi').drop(['geometry', 'geom2'], axis=1)
         cleaned_gdf6.head()
         world = gpd.read_file(gplt.datasets.get_path('world'))

         ax = gplt.sankey(cleaned_gdf6, projection=gcrs.Mollweide())
         gplt.polyplot(world, ax=ax, facecolor='lightgray', edgecolor='white')
         ax.set_global(); ax.outline_patch.set_visible(True)
         fig = plt.gcf()
         fig.set_size_inches(10, 8)
         plt.savefig('Fig 4D.JPG', bbox_inches = 'tight', dpi=300)
```

```
C:\Users\user\.conda\envs\stat\lib\site-packages\pandas\core\dtypes\cast.py:127: ShapelyDeprecationWarning: The array interface is deprecated and will no longer work in Shapely 2.0. Con
vert the '.coords' to a numpy array instead.
  arr = construct_1d_object_array_from_listlike(values)
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e '.coords' to a numpy array instead.
  return shapely.geometry.LineString(geom)
C:\Users\user\.conda\envs\stat\lib\site-packages\shapely\geometry\linestring.py:47: ShapelyDeprecationWarning: The array interface is deprecated and will no longer work in Shapely 2.0.
Convert the '.coords' to a numpy array instead.
  ret = geos_linestring_from_py(coordinates)

---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
Cell In[56], line 11
      9 ax = gplt.sankey(cleaned_gdf6, projection=gcrs.Mollweide())
     10 gplt.polyplot(world, ax=ax, facecolor='lightgray', edgecolor='white')
---> 11 ax.set_global(); ax.outline_patch.set_visible(True)
     12 fig = plt.gcf()
     13 fig.set_size_inches(10, 8)

AttributeError: 'GeoAxesSubplot' object has no attribute 'outline_patch'
```
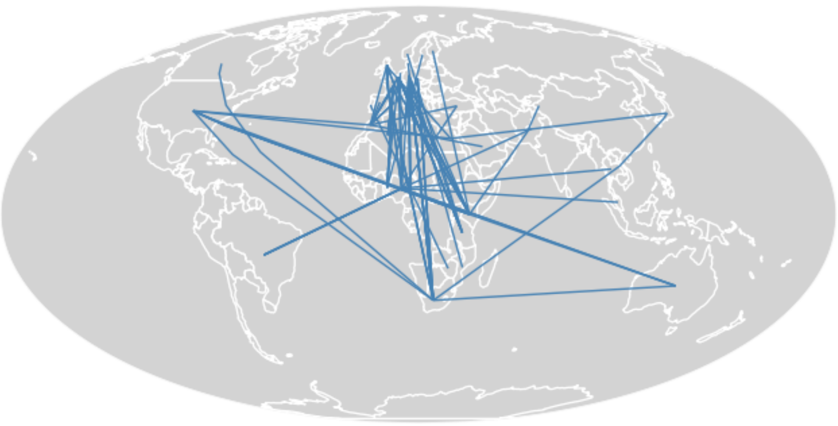
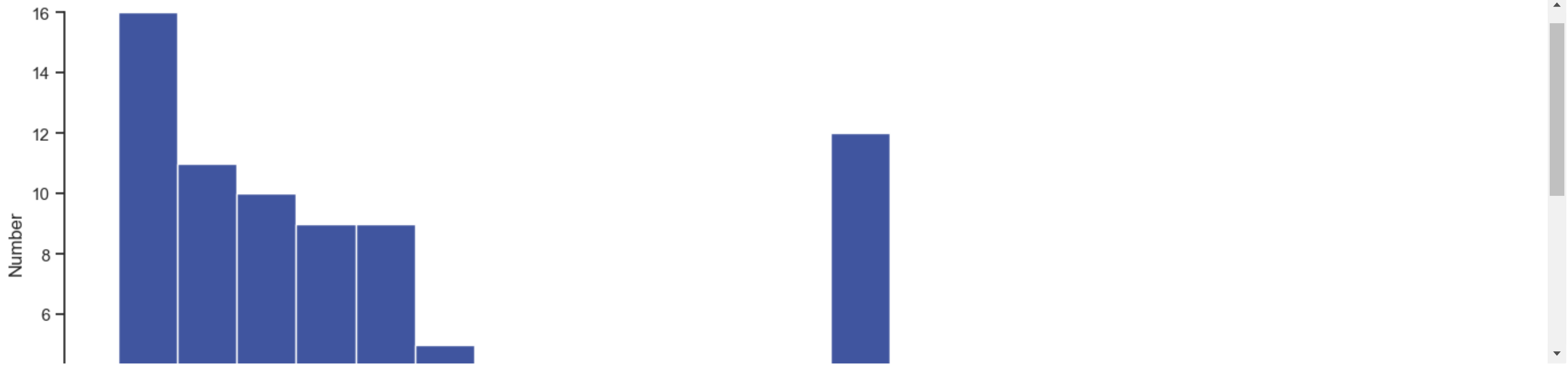



```
In [50]: df6 = pd.read_csv('INT_COLAB.csv',encoding='latin-1')
```

```
In [51]: Count7 = pd.crosstab(index=df6['Country of external collaboration 1'], columns='counts')
         Count7['percent'] = (Count7['counts'] / Count7['counts'].sum()) * 100
         Count7
```

```
Out[51]:
                                      col_0  counts    percent
         Country of external collaboration 1
                                  Australia       4   4.597701
                                    Belgium      10  11.494253
                                     Brazil       5   5.747126
                                     Canada       1   1.149425
                             Czech Republic       3   3.448276
                                    Denmark       1   1.149425
                                    Finland       1   1.149425
                                     France      11  12.643678
                                    Germany      16  18.390805
                                      Italy       2   2.298851
                                      Japan       2   2.298851
                                   Malaysia       1   1.149425
                                Netherlands       1   1.149425
                                     Norway       1   1.149425
                                   Pakistan       1   1.149425
                                   Portugal       1   1.149425
                               Saudi Arabia       1   1.149425
                                      Spain       2   2.298851
                                     Sweden       1   1.149425
                                   Thailand       1   1.149425
                                     Turkey       2   2.298851
                                         UK       9  10.344828
                                        USA       9  10.344828
                                    Ukraine       1   1.149425
```

```
In [76]: Count7.to_csv('conlc__.csv', index=True)
In [57]: df6["Country of external collaboration"] = pd.Categorical(df6["Country of external collaboration"],["Germany",
         "France",
         "Belgium",
         "UK",
         "USA",
         "Brazil",
         "Australia",
         "Czech Republic",
         "Italy",
         "Japan",
         "Spain",
         "Turkey",
         "Others"])
         sns.set_theme(style="ticks", palette="dark")
         sns.histplot(x="Country of external collaboration",
                     data=df6)
         sns.despine(offset=10, trim=True)
         plt.xticks(rotation=90)
         plt.ylabel('Number')
         fig = plt.gcf()
         fig.set_size_inches(10, 6)
         plt.savefig('Fig 4B.JPG', bbox_inches = 'tight', dpi=300)
```



```
In [37]: Count8 = pd.crosstab(index=df6['Continent'], columns='counts')
         Count8['percent'] = (Count8['counts'] / Count8['counts'].sum()) * 100
         Count8
```

```
Out[37]:
                col_0  counts    percent
            Continent
                 Asia       6   6.896552
               Europe      62  71.264368
        North America      10  11.494253
              Oceanea       4   4.597701
        South America       5   5.747126
```

In [54]:

```
df4 = pd.read_csv('Afri_Colab.csv',encoding='latin-1')
gdf4 = gpd.GeoDataFrame(df4, geometry=gpd.points_from_xy(df4.Longitude1, df4.Latitude1))
gdf4['geom2'] = [Point(x, y) for x, y in zip(df4.Longitude2, df4.Latitude2)]
gdf4['multi'] = [MultiPoint([x, y]) for x, y in zip(gdf4.geometry, gdf4.geom2)]
cleaned_gdf4 = gdf4.set_geometry('multi').drop(['geometry', 'geom2'], axis=1)
world = gpd.read_file(gpd.datasets.get_path('naturalearth_lowres'))
Africa = (world[world['continent'] ==  'Africa'])

ax = gplt.sankey(cleaned_gdf4, projection=gcrs.Mollweide())
gplt.polyplot(Africa, ax=ax, facecolor='white', edgecolor='lightgray')
fig = plt.gcf()
fig.set_size_inches(10, 8)
plt.savefig('Fig 4C.JPG', bbox_inches = 'tight', dpi=300)
```

```
C:\Users\user\.conda\envs\stat\lib\site-packages\pandas\core\dtypes\cast.py:127: ShapelyDeprecationWarning: The array interface is deprecated and will no longer work in Shapely 2.0. Con
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  return shapely.geometry.LineString(geom)
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Convert the '.coords' to a numpy array instead.
  ret = geos_linestring_from_py(coordinates)
```

In [ ]:

```
df4_1 = pd.read_csv('fund_bar_1.csv', encoding='latin-1')
df4_1["Top Local Funders"] = pd.Categorical(df4_1["Top Local Funders"],["NRF South Africa",
"ICIPE Kenya",
"NFSR Algeria",
"IFAD Kenya",
"KG Kenya",
"MHESR, Algeria",
"TMHESR Tunisia",
])
sns.set_theme(style="ticks", palette="dark")
sns.histplot(x="Top Local Funders",
            data=df4_1)
sns.despine(offset=10, trim=False)
plt.ylim(0, 20)
plt.xticks(rotation=90)
plt.ylabel('Number')
fig = plt.gcf()
fig.set_size_inches(5, 6)
plt.savefig('Fig 3D.JPG', bbox_inches = 'tight', dpi=300)
```

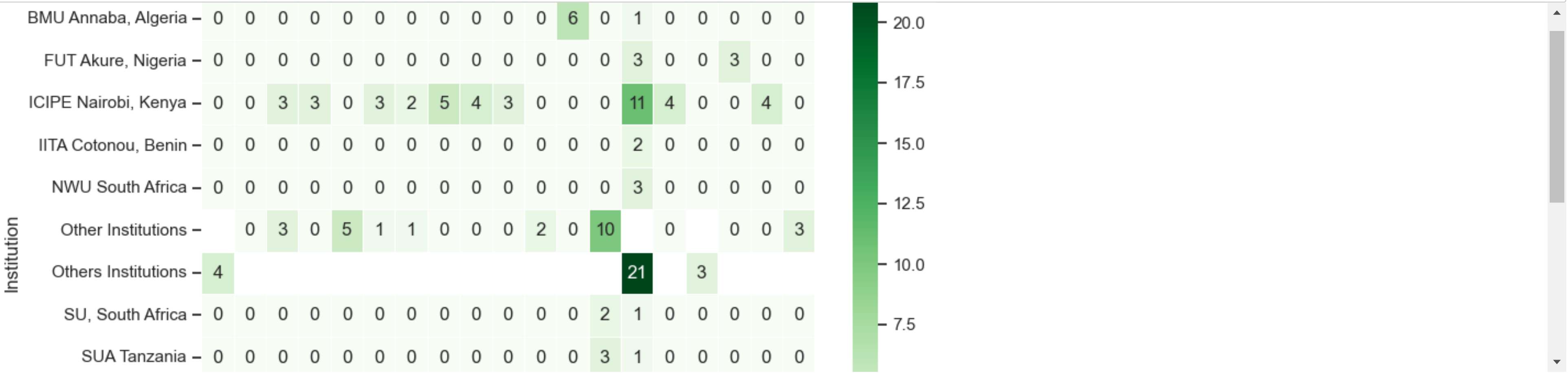
In [59]:
```
df9 = pd.read_csv('FND.csv', encoding='latin-1')
df9_1 = df9.pivot("Institution", "Funder", "Number")
```

```
C:\Users\user\AppData\Local\Temp\ipykernel_13052\69026121.py:2: FutureWarning: In a future version of pandas all arguments of DataFrame.pivot will be keyword-only.
  df9_1 = df9.pivot("Institution", "Funder", "Number")
```

In [ ]:
```
fmt="d","BMU Annaba, Algeria","FUT Akure, Nigeria","ICIPE Nairobi, Kenya","IITA Cotonou, Benin","NWU South Africa","SU, South Africa","SUA Tanzania","UI, Nigeria","UP South Africa","UT E
```

In [ ]:

In [60]:
```
# Draw a heatmap with the numeric values in each cell
f, ax = plt.subplots(figsize=(9, 6))
sns.heatmap(df9_1, annot=True, linewidths=.5, cmap='Greens', ax=ax)
fig = plt.gcf()
plt.savefig('Fig 3E.JPG', bbox_inches = 'tight', dpi=300)
```



In [ ]: