Appendix S3.

A) Data sources of studies on functional impacts of species occurring in the Serengeti National Park, Tanzania

B) Preliminary findings on non-trophic interactions and associated species in African savannas

A) Data sources of studies on functional impacts of species occurring in the Serengeti National Park, Tanzania

Node 79: Aardvark (*Orycteropus afer*):


Node 95: African elephant (*Loxodonta africana*):


Node 11: Ants (Formicidae):


Node 83: Bushpig (*Potamochoerus porcus*):


Node 71: Dikdik (*Madoqua kirkii*):


Node 73: Duiker spp. (i.e. Common duiker, *Sylvicapra grimmia*):


Node 14: Dung beetles (Scarabaeidae):


Node 92: Giraffe (*Giraffa camelopardalis*):


Node 94: Hippopotamus (*Hippopotamus amphibious*):

Node 73: Impala (*Aepyceros melampus*):


Node 91: Nile crocodile (*Crocodylus niloticus*):

Node 31: Small rodents (e.g. *Mastomys* sp., *Rattus rattus*):

Node 71: Steenbuck (*Raphicerus campestris*):
_Biodivers. Conserv.,_ 8, 1643-1661.

**Node 12: Termites (Macrotermes sp., Odontotermes sp.):**


**Nodes 62-63: Vultures (Torgos tracheliotus, Gyps sp.):**


**Node 87: Wildebeest (Connochaetes taurinus):**
**B) Preliminary findings on non-trophic interactions and associated species in African savannas**

* HM = habitat/landscape modifiers, KS = keystone species, EE = ecosystem engineer, SD = seed disperser, DC = disease control, DD = disease disperser.

<table>
<thead>
<tr>
<th>Species (node)</th>
<th>Activity/Impact</th>
<th>Functional role</th>
<th>Dependent species</th>
<th>Associated Nodes</th>
<th>References</th>
</tr>
</thead>
</table>
| Impala (73)    | Browses seedlings and saplings, grazing; Constrain tree recruitment and maintain stability of grasslands | HM | - Medium-sized grazing mammals (+)  
- Afr. Wild cat (+)  
- Bat-eared fox (+)  
- Small-spotted genet (+) | 73  
50  
| Wildebeest (87) | Grazing in large numbers; Reduce grass and herb biomass (height), preserve dicot species, reduce fire | HM / KS  
- grazing Buffalo (+)  
- grazing Topi (+)  
- grazing Waterbuck (+)  
- Insects (short-grass grasshoppers) (+)  
- Long-grass birds (-) (warbler *Cisticola*, larks)  
- Short-grass birds (+) (lark *Calandrella*, wheatear *Oenanthe, Cisticola aridulus*) | 88  
87 | Sinclair & Arcese1995; Sinclair 2003 |
| Crocodile (91) | Mix water column; Prevent anoxic conditions and promote aquatic life, affect hydrological dynamics of rivers, alter dynamics of nutrients | EE | - Aquatic life / fish (+)  
- Terrapins (+) | 37  
35  
| Giraffe (92)   | Browses medium-sized, recruitment trees; Reduce | HM | - Impala (+)  
- Nesting birds (+ once out | 73 | Croze 1974; Pellew 1983; Owen-Smith 1988 (in |
<table>
<thead>
<tr>
<th>Wildlife</th>
<th>Action/Impact</th>
<th>Predator Prey</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mature trees, limit fire-escaping size of trees, select for browse-tolerant Acacia species</td>
<td>of reach, otherwise -)  - Thicket-dwelling mammals (-)  - Insect. and graniv. birds (-)  - Ground dwelling arthropods (-)  - Small mammals (+)</td>
<td>31</td>
<td>Sinclair 2003; Ruess &amp; Halter 1990; Bond &amp; Loffell 2001; Ogada et al. 2008; Parker &amp; Bernard 2005</td>
</tr>
<tr>
<td>Hippo (94)</td>
<td>Constant local bulk-grazing, movement to and from water, and channel wallowing; Create high-quality grazing lawns, spatial heterogeneity; prevent sedimentation of pools, aerate water pools and promote aquatic life; eutrophication by dung</td>
<td>- Aquatic life / larger fish (+)  - Amphibians (+)  - Crocodile (+)  - Short-grass grazing Wildebeest, impala, warthog (+)</td>
<td>37 35 91 87 73 82</td>
</tr>
<tr>
<td>Elephant (95)</td>
<td>Browses and damages mature trees; Alter grass:tree balance, fire susceptibility, accelerating nutrient cycling, seed disperser of tree Balwil</td>
<td>- Lizards (-)  - Migrant birds (-)  - Insect. and graniv. birds (-)  - Ground dwelling arthropods (-)  - Dung beetles (+)  - Small mammals &lt;2 kg (+)  - Guineafowl (+)  - Impala (+)  - browsing Lesser kudu (-)  - browsing Giraffe (-)  - grazing Zebra (+)  - grazing Buffalo (+)</td>
<td>14 31 47 73 87 88</td>
</tr>
<tr>
<td>Animal</td>
<td>Description</td>
<td>Interaction Notes</td>
<td>References</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Dikdik (71)</td>
<td>Resident browsing of young trees; Reduces and inverses shrub encroachment/recruitment rate</td>
<td>HM - Thorny, unpalatable bushes (+)</td>
<td>Augustine &amp; McNaughton 2004; Blaum et al. 2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Afr. Wild cat (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Bat-eared fox (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Small-spotted genet (+)</td>
<td></td>
</tr>
<tr>
<td>Aardvark (79)</td>
<td>Excavate burrows, dig for ants and termites; bioturbation, habitat creation</td>
<td>HM - Small mammals (Mastomys, Mus, Aethomys, Gerbil) (+)</td>
<td>Smithers 1971; Peirce, 1974; Skinner &amp; Smithers 1990; Whittington-Jones 2006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Birds (Kingfisher, bee-eater, swallow sp., chat sp.) (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Reptiles (Afr. Rock python) (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Invertebrates, parasites (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Porcupine (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Warthog (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Bat-eared fox (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Aardwolf, black-backed jackal (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Different and less diverse plant communities</td>
<td></td>
</tr>
<tr>
<td>Bushpig</td>
<td>Seed predator; Tree seed destruction, seed dispersal, accelerating nutrient cycling, soil turnover</td>
<td>HM - Crops and humans (-)</td>
<td>Struhsaker 1975; Ghiglieri et al. 1982</td>
</tr>
<tr>
<td>Steenbuck</td>
<td>Browses seedlings and saplings; Constrain tree recruitment</td>
<td>HM - Afr. Wild cat (+)</td>
<td>Belsky 1984; du Toit 1990; Blaum et al. 2007</td>
</tr>
<tr>
<td>Common duiker</td>
<td>Seed predation; Dispersal of trees/plants?</td>
<td>SD - Thicket-dwelling mammals (+)</td>
<td>Wilkie et al. 1998</td>
</tr>
<tr>
<td>Node Type</td>
<td>Description</td>
<td>Interaction Sites</td>
<td>Node(s)</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Mound-building termites (12)</td>
<td>Soil perturbation, upheaval; Affect soil chemical and physical properties, hydraulics, nutrient accumulation/release/cycling</td>
<td>EE</td>
<td>- Grazing mammals (+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Browsing large mammals, elephant/rhino (+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Ants (+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Small mammals (+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Reptiles (snakes, lizards) (+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Birds (+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Arthropods (+)</td>
</tr>
<tr>
<td>Scavenging vultures (51)</td>
<td>Rapid clearing away of carcasses; Disease control</td>
<td>DC</td>
<td>- Seavenging rats, feral cats, rodents (-)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Dogs (-)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Crows (+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Other scavenging birds, e.g. Marabou (+)</td>
</tr>
<tr>
<td>Small rodents (mice, rats)</td>
<td>Seed predation, susceptible to diseases, occur in large numbers/outbreaks; Suppressed recruitment of seedlings, may affect plant composition, may carry ticks and other diseases, contaminate water via feces and urine</td>
<td>SD/DD</td>
<td>- Crops and livestock (-) (contact with urine, droppings, nesting material)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Diseases (+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Plant biomass (-) (in absence of larger ungulates)</td>
</tr>
<tr>
<td>Ants</td>
<td>Grass-cutting; reduce plant production, C and N spatial heterogeneity via nests, nutrient enrichment of soil</td>
<td>EE</td>
<td>- Birds (-)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>References</td>
</tr>
<tr>
<td>--------</td>
<td>------------------------------------------------------------------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>


