MOROCCAN AGRO-CLIMATIC ZONES
Adapted from FAO Classification & ONCA (National Office of Agricultural Council)

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1. Mediterranean Zone *(Northern Plains & Rif Mountains)*

Subzones & Characteristics:

- **Gharb-Loukkos**:
  - Rainfall: 600–900 mm/year
  - Temperature Range: 8–28°C
  - Key Constraint: Winter waterlogging
- **Rif Occidental**:
  - Rainfall: 700–1,200 mm/year
  - Temperature Range: 5–26°C
  - Key Constraint: Soil erosion on slopes
- **Oriental**:
  - Rainfall: 300–500 mm/year
  - Temperature Range: 10–34°C
  - Key Constraint: Summer drought risk

Dominant Crops:

- *Irrigated*: Citrus (75% of national production), sugarcane, rice
- *Rainfed*: Durum wheat, faba beans, sunflowers
- *Specialty*: Cannabis (legal cultivation in Ketama)

Climate-Smart Practices:
✓ Water table management (Gharb)
✓ Contour terracing (Rif slopes)
✓ Early-maturing wheat varieties (Oriental)

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2. Semi-Arid Zone *(Atlas Valleys & Plateaus)*

Subzones & Conditions:

- **Tadla**:
  - Rainfall: 250–400 mm/year
  - Growing Season: October to April
  - Soil Type: Vertisols (cracking clay)
- **Haouz**:
  - Rainfall: 200–350 mm/year
  - Growing Season: November to May
  - Soil Type: Calcisols (high lime)
- **Souss-Massa**:
  - Rainfall: 150–300 mm/year

    - Growing Season: Year-round*
    - Soil Type: Sandy loams

Key Adaptations:

- Drip irrigation (90% adoption in Souss)
- Phosphate fertilization (Haouz soils fix phosphorus)
- Fog harvesting (pilot projects in Anti-Atlas)

Crop Calendar Example – Tadla:

- **November**: Wheat sowing (50 mm water demand)
- **February**: First nitrogen application (30 mm)
- **May**: Barley harvest (0 mm)

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3. Arid Zone *(Pre-Saharan & Sahara Margins)*

Climate Characteristics:

- Rainfall: Less than 200 mm/year (highly erratic)
- Evapotranspiration: Over 2,500 mm/year
- Growing Window: 90–120 days (mostly in winter)

Oasis Systems & Signature Crops:

- **Tafilalet**: Underground *khettara* – Medjool dates
- **Draa Valley**: Dam-controlled water – Henna, pomegranate
- **Figuig**: Springs – Alfalfa seed

Survival Strategies:

- Palm-canopy agroforestry (3-layer system)
- Night irrigation (reduces evaporation by 40%)
- Salt-tolerant crops (e.g., quinoa trials in Zagora)

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4. Mountain Zones *(High & Middle Atlas)*

Farming by Elevation:

- **Below 1,200m**: Low frost risk – Apple orchards
- **1,200–1,800m**: Moderate frost risk – Walnuts, cherries
- **Above 1,800m**: High frost risk – Transhumant sheep grazing

Unique Agricultural Features:

- Snowmelt agriculture (planting in June–August)

- Terraced barley fields (ancestral Amazigh practice)
- Wild aromatic plants: thyme, rosemary

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5. Coastal Agroecosystems

Microclimate Effects:

- **Atlantic Coast**:
  - Summer Humidity: 75–85%
  - Salinity Risk: High
  - Key Crop: Tomatoes (for export)
- **Mediterranean Coast**:
  - Summer Humidity: 65–75%
  - Salinity Risk: Moderate
  - Key Crop: Strawberries

Management Challenges:

❗ Salinization: Causes 3% annual yield loss in Gharb

❗ Sea breeze deposition: Salt burns on plant leaves

Climate Change Projections (2030–2050)

- **Mediterranean Zone**:
  +1.8°C, 15% less rainfall – Wheat yields to decline
- **Semi-Arid Zone**:
  +2.3°C, 20% less rainfall – Irrigation demand to rise by 35%
- **Arid Zone**:
  +2.5°C, 10% more storm intensity – Increased water scarcity in oases

Policy Responses:

- *National Adaptation Plan (NAP-Ag)*: Subsidies for drought-resistant seeds
- *DAMANE Program*: Construction of 15 new hill reservoirs by 2030